# AQUATIC INVERTEBRATE ASSEMBLAGES AND BIOLOGICAL ASSESSMENTS: STREAM SITES IN THE CITY OF BELLEVUE, WASHINGTON

**2010**

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## INTRODUCTION

This brief report summarizes and interprets aquatic macroinvertebrate data collected in August 2010 at stream sites in the City of Bellevue, King County, Washington. The objectives of this study include using the invertebrate biota to detect impairment to biological health, using 2 assessment tools: the B-IBI (Benthic Index of Biological Integrity) (Kleindl 1995, Fore et al. 1996, Karr and Chu 1999), which is a battery of 10 biological metrics calibrated for streams of the Pacific Northwest, and a predictive model (RIVPACS – the River InVertebrate Prediction and Classification System) developed by the Washington Department of Ecology (WADOE). RIVPACS compares the occurrence of taxa at a site with the taxa expected at a similar site with minimal human influence, and yields a score that summarizes the comparison. These assessment tools provide a summary score of biological condition, and the B-IBI can be translated into biological health condition classes (i.e., excellent, good, fair, poor, and very poor) based on ranking criteria used by King County (King County 2008). In addition, this report identifies probable stressors which may account for diminished stream health, basing these observations on demonstrated and expected associations between patterns of response of B-IBI metrics and other metric expressions, as well as the taxonomic and functional composition of the benthic assemblages. The analysis examines common stressors associated with urbanization: water quality degradation, changes to natural thermal regimes, loss and impairment of instream habitats due to sediment deposition and altered flow regimes, and disturbance to reach scale habitat features such as streambanks, channel morphology, and riparian zone integrity.

This study has 2 additional objectives, one of which is to evaluate the effect of taxonomic resolution on bioassessment scores and narrative interpretation. In past projects, midges (Diptera: Chironomidae) and aquatic worms (Oligochaeta) were identified to coarse taxonomic resolution. To assess additional information that might be gained with further study of these groups, midges and worms were identified to generic levels in 2010. In an addendum to this report, additional ecological and possibly diagnostic information obtained by finer taxonomic resolution is analyzed, and contrasted with results obtained from coarser taxonomy.

In 2010, the City of Bellevue added some variations to the protocols for sample handling and taxonomy, in order to assess the effect of subsampling methods on bioassessment outcomes. For past projects, samples were sorted to 500-count subsamples, although in many cases samples did not contain 500 organisms, and were completely sorted to achieve subsamples with counts of less than 500 organisms. For 5 of the 16 samples submitted in 2010, sorting to 700 organisms was attempted. Only 1 of these replicates contained at least 700 organisms: the rest were completely sorted and resulted in sample counts of somewhat fewer than 700 organisms.

## METHODS

### Sampling

The City of Bellevue provided oversight for the collection of 16 aquatic invertebrate samples from 8 sites on 7 streams. Samples were processed and invertebrates identified by Rhithron Associates, Missoula, Montana.

### Sample processing

In the laboratory, standard sorting protocols were applied to achieve representative subsamples of aquatic organisms. Caton sub-sampling devices (Caton 1991), divided into 30 grids, each approximately 5 cm by 6 cm were used. Each individual sample was thoroughly mixed in its jar(s), poured out and evenly spread into the Caton tray, and individual grids were randomly selected. The contents of each grid were examined under stereoscopic microscopes using 10x-30x magnification. All aquatic invertebrates from each selected grid were sorted from the substrate, and placed in 95% ethanol for subsequent identification. The final selected grid was completely sorted of all organisms. All unsorted sample fractions were retained and stored at the Rhithron laboratory. Samples were sorted to targets of either 500 or 700 organisms, per City of Bellevue directives.

Organisms were individually examined by certified taxonomists, using 10x – 80x stereoscopic dissecting scopes (Leica S8E and S6E) and identified to target taxonomic levels consistent with B-IBI for Puget Sound Lowlands streams protocols, using appropriate published taxonomic references and keys. Identification, counts, life stages, and information about the condition of specimens were recorded on bench sheets. To obtain accuracy in richness measures, organisms that could not be identified to the target level specified were designated as “not unique” if other specimens from the same group could be taken to target levels. Organisms designated as “unique” were those that could be definitively distinguished from other organisms in the sample. Identified organisms were preserved in 95% ethanol in labeled vials, and archived at the Rhithron laboratory.

Midges and worms were carefully morphotyped using 10x – 80x stereoscopic dissecting microscopes (Leica S8E and S6E) and representative specimens were slide mounted and examined at 200x – 1000x magnification using an Olympus BX 51 compound microscope with Hoffman contrast. Slide mounted organisms were archived at the Rhithron laboratory.

### Quality control procedures

Quality control procedures for initial sample processing and subsampling involved checking sorting efficiency. These checks were conducted on 100% of the samples by independent observers who microscopically re-examined 20% of sorted substrate from each sample. All organisms that were missed were counted and this number was added to the total number obtained in the original sort. Sorting efficiency was evaluated by applying the following calculation:

$$SE = \frac{n_1}{n_{1+2}} \times 100$$

where: SE is the sorting efficiency, expressed as a percentage, $n_1$ is the total number of specimens in the first sort, and $n_2$ is the total number of specimens expected in the second sort, based on the results of the re-sorted 20%.

Quality control procedures for taxonomic determinations of invertebrates involved checking accuracy, precision and enumeration. Two samples were randomly selected and all organisms re-identified and counted by an independent taxonomist. Taxa lists and enumerations were compared by calculating a Bray-Curtis similarity statistic (Bray and Curtis 1957) for each selected sample. Routinely, discrepancies between the original identifications and the QC identifications are discussed among the taxonomists, and necessary rectifications to the data are made. Discrepancies that cannot be rectified by discussions are routinely sent out to taxonomic specialists for identification. Because of Rhithron's extensive experience with the Puget Sound Lowlands aquatic fauna, confidence in identifications was high, and discrepancies involved only minor enumeration inaccuracies: no verifications from outside specialists were necessary.

## Data analysis

A database application (RAILIS v. 1.2 – Rhithron Associates, Inc.) was used to calculate all B-IBI metrics and scores. RIVPACS scores were obtained by entering data into a web-based application maintained by the Utah State University's Western Center for Monitoring and Assessment of Freshwater Ecosystems. Related applications on this website produce a taxa list from each sample by a random re-sampling routine that standardizes sample sizes. Some taxa are excluded from the analysis. Output from the RIVPACS applications provide a RIVPACS score for each replicate.

Comparisons between B-IBI and RIVPACS results are facilitated by the similarity in impairment thresholds for the 2 assessment tools, particularly when B-IBI scores are transformed into a percent of maximum score: the impairment threshold for Washington RIVPACS was set by the Washington Department of Ecology (WADOE) at 0.73 (WADOE 2006), and the threshold adopted by King County for distinguishing between "good" and "fair" conditions indicated by B-IBI scores is between 72% (B-IBI = 36) and 76% (B-IBI = 38) of maximum score (King County 2008).

Metric and taxonomic signals for sediment deposition, thermal stress, water quality (including the presence of possible metals contamination), and habitat indicators were investigated and described in narrative interpretations. These interpretations of the taxonomic and functional composition of invertebrate assemblages are based on demonstrated associations between assemblage components and habitat and water quality variables gleaned from the published literature, the writer's own research and professional judgment, and those of other expert sources (e.g. Wisseman 1998). These interpretations are not intended to replace canonical procedures for stressor identification, since such procedures require substantial surveys of habitat, and historical and current data related to water quality, land use, point and non-point source influences, soils, hydrology, geology, and other resources that were not readily available for this study. Instead, attributes of invertebrate taxa that are well-substantiated in

diverse literature, published and unpublished research, and that are generally accepted by regional aquatic ecologists, are combined into descriptions of probable water quality and instream and reach-scale habitat conditions. The approach to this analysis uses some assemblage attributes that are interpreted as evidence of water quality and other attributes that are interpreted as evidence of habitat integrity. To arrive at impairment classifications, attributes are considered individually, so information is maximized by not relying on a single cumulative score, which may mask stress on the biota.

Water quality variables are estimated by examining mayfly taxa richness and the Hilsenhoff Biotic Index (HBI) value. Other indications of water quality include the richness and abundance of hemoglobin-bearing taxa and the richness of sensitive taxa. Mayfly taxa richness has been demonstrated to be significantly correlated with chemical measures of dissolved oxygen, pH, and conductivity (e.g. Bollman 1998, Fore et al. 1996, Wisseman 1998). The Hilsenhoff Biotic Index (HBI) (Hilsenhoff 1987) has a long history of use and validation (Cairns and Pratt 1993). The index uses the relative abundance of taxa and the tolerance values associated with them to calculate a score representative of the tolerance of a benthic invertebrate assemblage. Higher HBI scores indicate more tolerant assemblages. In one study, the HBI was demonstrated to be significantly associated with conductivity, pH, water temperature, sediment deposition, and the presence of filamentous algae (Bollman 1998). Crops of filamentous algae are also suspected when macroinvertebrates associated or dependent on it (e.g. LeSage and Harrison 1980, Anderson 1976) are abundant. Nutrient enrichment in streams often results in large crops of filamentous algae (Watson 1988). Hemoglobin-bearing taxa are very tolerant of environments with low oxygen concentrations, since the hemoglobin in their circulating fluids enables them to carry more oxygen than organisms without it. Low oxygen concentrations are often a result of nutrient enrichment in situations where enrichment has encouraged excessive plant growth; nocturnal respiration by these plants creates hypoxic conditions. Sensitive taxa exhibit intolerance to a wide range of stressors (e.g. Wisseman 1996, Hellawell 1986, Barbour et al. 1999), including nutrient enrichment, acidification, thermal stress, sediment deposition, habitat disruption, and other causes of degraded ecosystem health. These taxa are expected to be present in predictable numbers in functioning streams.

Thermal characteristics of the sampled site are predicted by the richness and abundance of cold stenotherm taxa (Clark 1997) which require low water temperatures, and by calculation of the predicted temperature preference of the macroinvertebrate assemblage (Brandt 2001). Hemoglobin-bearing taxa are also indicators of warm water temperatures (Walshe 1947). Dissolved oxygen is associated with water temperature (colder water can hold more dissolved oxygen) and can also vary with the degree of nutrient enrichment. Increased temperatures and high nutrient concentrations can, alone or in concert, create conditions favorable to hypoxic sediments, habitats preferred by hemoglobin-bearers.

Metals sensitivity for some groups, especially the heptageniid mayflies, is well-known (e.g. Clements 1999, Clements 2004, Fore 2003). In the present approach, the absence of these groups in environs where they are typically expected to occur is considered a signal of possible metals contamination, especially when these signals are combined with a measure of overall assemblage tolerance of metals. The Metals Tolerance Index

(MTI) (McGuire 1998) ranks taxa according to their sensitivity to metals. Weighting taxa by their abundance in a sample, assemblage tolerance is estimated by averaging the tolerance of all sampled individuals. Higher values for the MTI indicate assemblages with greater tolerance to metals contamination.

The condition of instream and streamside habitats is also estimated by characteristics of the macroinvertebrate assemblages. Stress from sediment deposition is evaluated by caddisfly richness and by clinger richness (Kleindl 1995, Bollman 1998, Karr and Chu 1999). A newer tool, the Fine Sediment Biotic Index (FSBI) (Relyea et al. 2000) is also used. Similar to the HBI, tolerance values are assigned to taxa based on the substrate particle sizes with which the taxa are most frequently associated. Scores are determined by weighting these tolerance values by the relative abundance of taxa in a sample. Higher values of the FSBI indicate assemblages with greater fine sediment sensitivity. However, it appears that FSBI values may be influenced by the presence of other deposited material, such as large organic material, including leaves and woody debris.

The functional characteristics of macroinvertebrate assemblages are based on the morphology and behaviors associated with feeding, and are interpreted in terms of the River Continuum Concept (Vannote et al. 1980) in the narratives. Alterations from predicted patterns may be interpreted as evidence of water quality or habitat disruption. For example, shredders and the microbes they depend on are sensitive to modifications of the riparian zone vegetation (Plafkin et al. 1989), and the abundance of invertebrate predators is likely to be related to the diversity of invertebrate prey species, and thus the complexity of instream habitats.

## RESULTS

### Quality Control Procedures

Results of quality control procedures for subsampling and taxonomy for 2010 samples are given in Table 1. Sorting efficiency averaged 97.51%, and taxonomic precision for identification and enumeration averaged 95.49% for the randomly selected QA samples. These similarity statistics fall within acceptable industry criteria (Stribling et al. 2003).

### Data analysis

Taxa lists and counts, and values and scores for standard bioassessment metrics for composited replicate samples are given in the Appendix. Table 2 summarizes B-IBI and RIVPACS scores for samples and replicates. B-IBI scores varied from 16 to 26 for City of Bellevue sample replicates collected in 2010. These scores indicated “poor” conditions for 14 of the replicates. Two replicates (Phantom and Lewis replicate 2) were rated “fair”. Average B-IBI scores for replicates collected at each site are graphed in Figure 1. RIVPACS scores varied from 0.17 to 0.67. These scores indicated impaired biological conditions in 2010 for all 16 sample replicates. Average RIVPACS scores for replicates collected at each site are graphed in Figure 2.

B-IBI scores and RIVPACS results were strongly correlated with each other for the 16 replicates in this study ($r = 0.747$, $p = 0.0009$). Figure 3 illustrates this relationship.

**Table 1.** Results of internal quality control procedures for subsampling and taxonomy. City of Bellevue, 2010.

| RAI Sample ID | Station name and replicate number | Alternate station name | Sorting efficiency (%) | Bray-Curtis similarity (%) |
|---|---|---|---|---|
| CB10LD001 | Goff Creek just upstream of confluence w/ West Trib Rep 1 | Goff 1 | 96.11 | |
| CB10LD002 | Goff Creek just upstream of confluence w/ West Trib Rep 2 | Goff 2 | 98.14 | |
| CB10LD003 | Goff Creek just upstream of confluence w/ West Trib Rep 3 | Goff 3 | 97.25 | |
| CB10LD004 | Lower Phantom, just upstream of W Lk Samm in Weowna Park | Phantom 1 | 98.25 | |
| CB10LD005 | West Trib in Kelsey Farm, restored reach Rep 1 | W. Trib Kelsey 1 | 97.27 | 95.77 |
| CB10LD006 | West Trib in Kelsey Farm, restored reach Rep 2 | W. Trib Kelsey 2 | 97.29 | |
| CB10LD007 | West Trib in Kelsey Farm, restored reach Rep 3 | W. Trib Kelsey 3 | 98.23 | |
| CB10LD008 | Lakehurst just upstream of pond, E of I405 | Lakehurst 1 | 96.4 | |
| CB10LD009 | Newport stabilized reach d/s of swim club on 119th Rep 1 | Newport 1 | 99.12 | |
| CB10LD010 | Newport stabilized reach d/s of swim club on 119th Rep 2 | Newport 2 | 96.53 | |
| CB10LD011 | Newport stabilized reach d/s of swim club on 119th Rep 3 | Newport 3 | 97.37 | |
| CB10LD012 | Wilkins Upstream of Bypass, at NE 8th & Northup Wy. | Wilkins 1 | 96.94 | |
| CB10LD013 | Wilkins In bypass reach, near NE 8th & Northup Wy. | Wilkins 2 | 98.31 | 95.21 |
| CB10LD014 | Lewis on Lakemont Blvd. at I-90 Rep 1 | Lewis 1 | 98.03 | |
| CB10LD015 | Lewis on Lakemont Blvd. at I-90 Rep 2 | Lewis 2 | 96.99 | |
| CB10LD016 | Lewis on Lakemont Blvd. at I-90 Rep 3 | Lewis 3 | 97.93 | |

**Table 2.** B-IBI scores and RIVPACS scores for sample replicates. City of Bellevue, 2010.

| RAI Sample ID | Station name and replicate number | Alternate station name | B-IBI score | RIVPACS score |
|---|---|---|---|---|
| CB10LD001 | Goff Creek just upstream of confluence w/ West Trib Rep 1 | Goff 1 | 18 | 0.32 |
| CB10LD002 | Goff Creek just upstream of confluence w/ West Trib Rep 2 | Goff 2 | 18 | 0.32 |
| CB10LD003 | Goff Creek just upstream of confluence w/ West Trib Rep 3 | Goff 3 | 16 | 0.32 |
| CB10LD004 | Lower Phantom, just upstream of W Lk Samm in Weowna Park | Phantom 1 | 26 | 0.51 |
| CB10LD005 | West Trib in Kelsey Farm, restored reach Rep 1 | W. Trib Kelsey 1 | 18 | 0.40 |
| CB10LD006 | West Trib in Kelsey Farm, restored reach Rep 2 | W. Trib Kelsey 2 | 18 | 0.32 |
| CB10LD007 | West Trib in Kelsey Farm, restored reach Rep 3 | W. Trib Kelsey 3 | 18 | 0.32 |
| CB10LD008 | Lakehurst just upstream of pond, E of I405 | Lakehurst 1 | 20 | 0.42 |
| CB10LD009 | Newport stabilized reach d/s of swim club on 119th Rep 1 | Newport 1 | 18 | 0.34 |
| CB10LD010 | Newport stabilized reach d/s of swim club on 119th Rep 2 | Newport 2 | 16 | 0.17 |
| CB10LD011 | Newport stabilized reach d/s of swim club on 119th Rep 3 | Newport 3 | 18 | 0.25 |
| CB10LD012 | Wilkins Upstream of Bypass, at NE 8th & Northup Wy. | Wilkins 1 | 22 | 0.34 |
| CB10LD013 | Wilkins In bypass reach, near NE 8th & Northup Wy. | Wilkins 2 | 22 | 0.34 |
| CB10LD014 | Lewis on Lakemont Blvd. at I-90 Rep 1 | Lewis 1 | 22 | 0.59 |
| CB10LD015 | Lewis on Lakemont Blvd. at I-90 Rep 2 | Lewis 2 | 26 | 0.67 |
| CB10LD016 | Lewis on Lakemont Blvd. at I-90 Rep 3 | Lewis 3 | 20 | 0.59 |

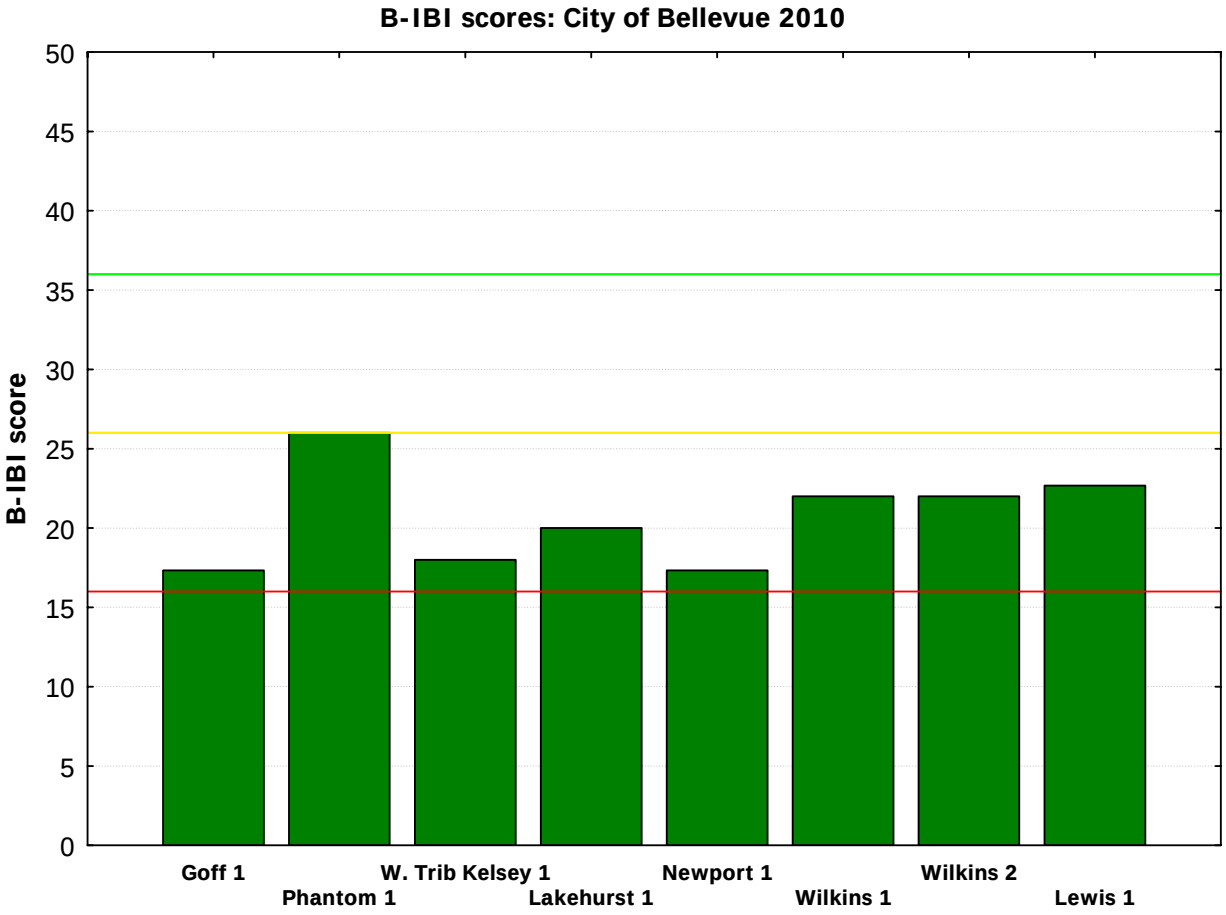


**Figure 1.** B-IBI scores for stream sites in the City of Bellevue, 2010. The green line indicates the threshold (B-IBI = 36) for "good" conditions, set by WADOE. Scores below the threshold indicate impaired conditions. The yellow line is the threshold (B-IBI = 26) for "fair" conditions; scores falling below the threshold indicate "poor" conditions. Scores falling below the red line (B-IBI = 16) indicate "very poor" conditions.

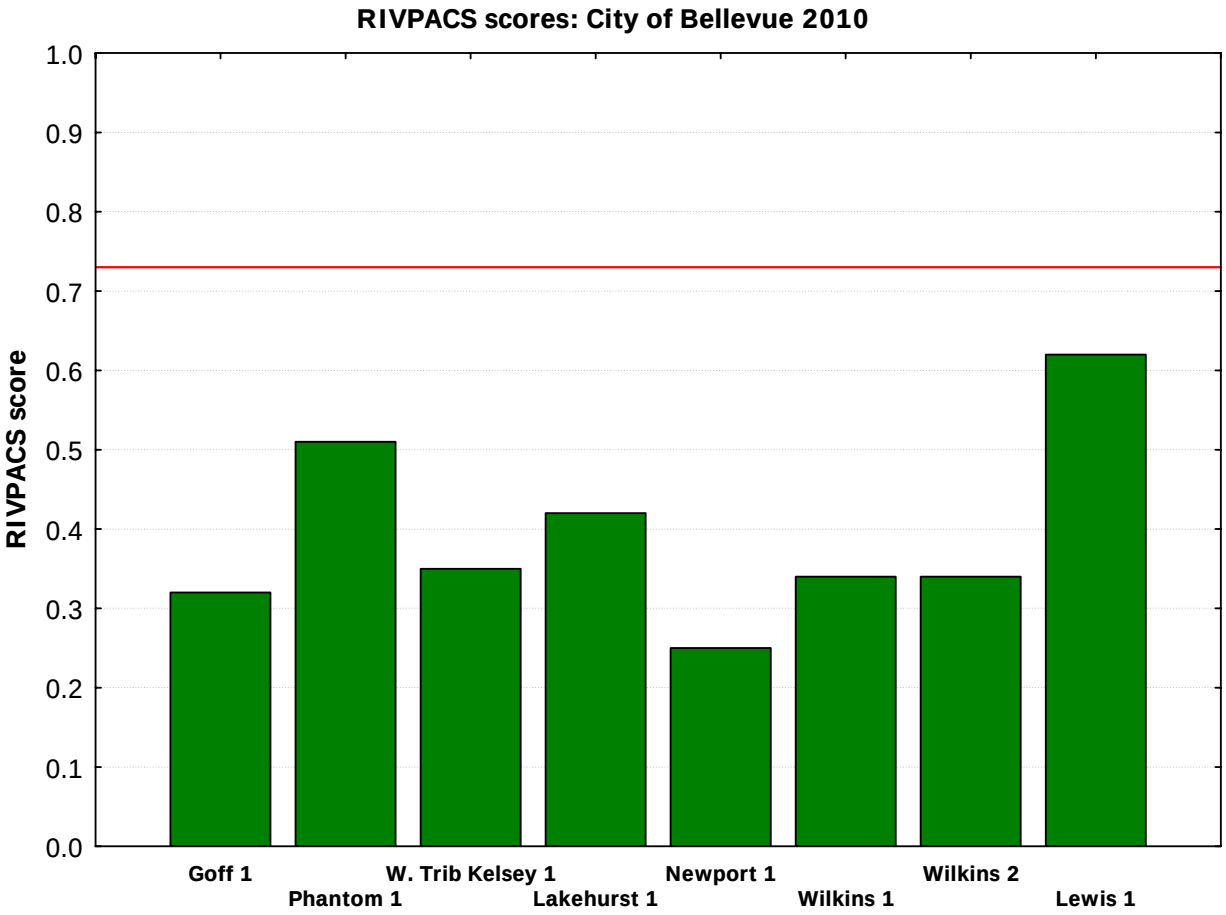


**Figure 2.** RIVPACS scores for stream sites in the City of Bellevue, 2010. The red line indicates the threshold (RIVPACS = 0.73) for "unimpaired" conditions, set by WADOE. Scores below the threshold indicate impaired conditions.

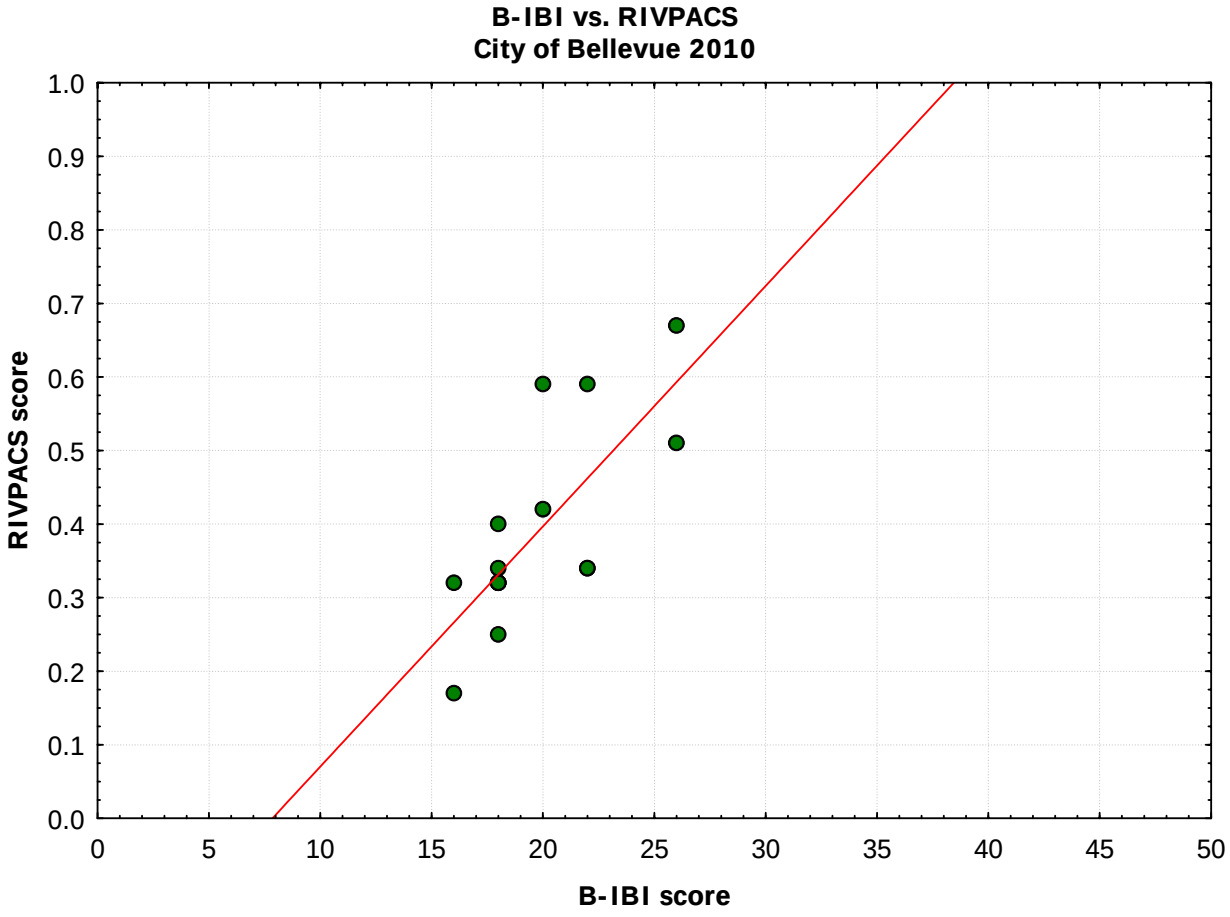


**Figure 3.** Correlation between B-IBI scores and RIVPACS scores for sites in the City of Bellevue, 2010. The relationship is significant: r= 0.747, $p$ = 0.0009.

## Aquatic invertebrate assemblage characteristics

### *Goff Creek upstream of confluence with West Trib.*

- **Bioassessment scores: 2010**

The average B-IBI score (17.3) for the 3 replicates collected at this site indicated "poor" biological conditions. Similarly, the average RIVPACS score (0.32) fell well within the range indicating impaired condition.

- **Indicators of ecological condition: 2010**

*a. Water quality*

The ubiquitous *Baetis tricaudatus* was the only mayfly taxon taken at this site in 2010. The biotic index value (5.06) was higher than expected for a functional stream in the Puget Sound Lowlands. These metric indicators of water quality suggest impairment in this reach. The samples were strongly dominated by blackflies (*Simulium* sp.) and oligochaetes (*Lumbriculus* sp.); these taxa suggest increased nutrient availability. No sensitive taxa were present in the samples. The metals tolerance index value (4.35) was relatively low, suggesting that metals contamination was probably not influential.

*b. Thermal condition*

No cold stenotherm taxa were collected at this site in 2010. The thermal preference estimated for the invertebrate assemblage was 15.7ºC.

*c. Sediment deposition*

Only 5 "clinger" taxa were counted; caddisflies were represented by a single immature specimen in the family Hydropsychidae. These findings strongly suggest that colonization of stony substrate habitats was severely limited, perhaps by sediment deposition. The FSBI value (3.23) indicated a sediment-tolerant assemblage. Abundant nemourid stoneflies and other shredder taxa suggests that leafy and woody debris may have littered the benthic substrate.

*d. Habitat diversity and integrity*

Overall taxa richness (34) was moderately high at this site, which may reflect moderate instream habitat diversity. Two stonefly taxa were collected in 2010; low richness in this group may be related to loss of riparian function, alteration of natural channel morphology, or streambank instability. Samples yielded only 2 semivoltine taxa, and neither was particularly abundant. The site may be subjected to periodic scour, thermal stress, toxic pollutants or other catastrophes that would interrupt long life cycles. Low numbers of chironomids in the sample also suggested that periodic scour may be influential. Shredder taxa, especially the nemourid stoneflies *Malenka* sp. and *Zapada cinctipes*, were abundant, suggesting that a significant component of the substrate may have been composed of large organic material such as leaves and woody debris. The

absence of scrapers may be related to dense shading of the channel, but may also be a reflection of the nature of the benthic substrate: dense cover of stony surfaces by leaf litter or sediment. Gatherers and filterers strongly dominated the functional composition of the assemblage; this pattern is sometimes interpreted as evidence of water quality degradation.

### *Lower Phantom, just upstream of W Lk Samm in Weowna Park*

- **Bioassessment scores: 2010**

A single sample was collected at this site in 2010. This sample yielded a comparatively high B-IBI score (26), indicating fair biological conditions. The RIVPACS score (0.51) indicated impaired conditions. The Lower Phantom sample yielded the highest bioassessment score among the sites in this study.

- **Indicators of ecological condition: 2010**

*a. Water quality*

A single mayfly taxon was collected at the Lower Phantom site in 2010: this was the ubiquitous taxon *Baetis tricaudatus*. Although low mayfly taxa richness suggests impaired water quality, another metric indicator of water quality gave a contrary result. The biotic index value (2.80) was very low, indicating a sensitive benthic assemblage. This finding, along with the presence of relatively sensitive taxa such as the stonefly *Sweltsa* sp. and the caddisfly *Glossosoma* sp. suggest that water quality was probably good in the reach. The metals tolerance index value (3.56) was elevated relative to the biotic index value, but other evidence, such as the occurrence of lumbriculid worms (*Lumbriculus* sp.) and leuctrid stoneflies, indicate that metals contamination probably did not influence the biota.

*b. Thermal condition*

The composition of the benthic fauna suggested cool-to-cold water temperatures: the calculated preference for the assemblage was 13.3ºC, the lowest calculated temperature preference among sites in this study. Cold stenotherm taxa were represented by immature leuctrid stoneflies.

*c. Sediment deposition*

Neither “clingers” (5 taxa) nor caddisflies (2 taxa) were as diverse as expected, suggesting that colonization of stony substrate habitats was limited, perhaps by sediment deposition. The FSBI value (3.66) indicated a moderately sediment-tolerant assemblage. The nemourid stoneflies *Malenka* sp. and *Zapada cinctipes* were abundant, suggesting that leafy and woody debris may have littered the channel floor.

*d. Habitat diversity and integrity*

Taxa richness (30) in the single sample collected at this site was relatively high, suggesting diverse instream habitats. The site supported at least 4 stonefly taxa: high richness in this group may be related to stable streambanks, natural channel morphology, and functional riparian zones. Three semivoltine taxa were collected in 2010, indicating stable instream conditions. All expected functional components were present in proportions that seemed appropriate for a small Puget Sound Lowlands stream.

### *West Trib in Kelsey Farm, restored reach*

- **Bioassessment scores: 2010**

Three replicate samples were collected at this site in 2010: the mean B-IBI score (18) indicated "poor" biotic integrity, and the mean RIVPACS score (0.35) was well within the range indicating impaired conditions.

- **Indicators of ecological condition: 2010**

*a. Water quality*

*Baetis tricaudatus* was the only mayfly taxon to be collected at this site, suggesting that water quality may have been impaired. The biotic index value (4.07) was somewhat elevated compared to expectations for a Puget Sound Lowlands stream. The collections were dominated by midges, which accounted for 42% of all sampled animals. Tolerant non-insect taxa, such as nematodes and amphipods, were abundant. Water quality was probably impaired in this reach. The metals tolerance index value (3.20) and the abundance of tanytarsine midges (*Micropsectra* sp.) suggest that metals contamination did not influence the biota here.

*b. Thermal condition*

Warm water temperatures were suggested by the abundance of the amphipod *Crangonyx* sp., the presence of leeches in the family Erpobdellidae, and the absence of cold stenotherm taxa. The thermal preference calculated for the assemblage was 15.3ºC.

*c. Sediment deposition*

Eight "clinger" taxa and 3 caddisfly taxa were counted: these findings suggest that stony substrate habitats were compromised. Sediment deposition could account for this, but there is evidence that leafy debris may have been abundant, since nemourid stoneflies (especially *Malenka* sp.) occurred in large numbers. The FSBI value (3.43) indicated a sediment-tolerant assemblage.

*d. Habitat diversity and integrity*

Although overall taxa richness (37) was high, 13 of the taxa collected were midges. Instream habitat diversity may have been limited. A single stonefly taxon, Malenka sp., was collected. Low richness in this group may be related to riparian zone disruption, unstable streambanks, or altered channel morphology. Semivoltine taxa were lacking: a single specimen of the elmid *Narpus* sp. was counted. Catastrophic dewatering, scour, toxic pollution, or other events that would interrupt long life cycles cannot be ruled out. The functional composition of the assemblage was dominated by gatherers, which may be an indication of water quality impairment. Filterers and shredders were the other groups that were well-represented. The absence of scrapers may be related to dense shading of the channel, but may also be partly due to obliteration of stony surfaces by leaf litter or sediment.

## *Lakehurst just upstream of pond, E of I405*

- **Bioassessment scores: 2010**

A single sample was collected at this site in 2010. This sample yielded a B-IBI score of 20, indicating "poor" biological conditions. The RIVPACS score (0.42) also indicated impairment.

- **Indicators of ecological condition: 2010**

*a. Water quality*

The sample collected at this site was dominated by the amphipod *Crangonyx* sp. and the blackfly *Simulium* sp. A single mayfly taxon was present: the ubiquitous *Baetis tricaudatus* was not particularly abundant. These findings, along with the moderately elevated biotic index value (4.91), are evidence of water quality impairment. A single specimen of the sensitive taxon *Rhyacophila grandis* was present in the sample, which suggests that microhabitats, perhaps influenced by groundwater, may provide refuges at the site. The metals tolerance index value (4.16) was not higher than the biotic index value, implying that metals contamination was probably not influential.

*b. Thermal condition*

No cold stenotherm taxa were encountered; in fact, many taxa in the sample prefer warm water temperatures. These taxa include *Crangonyx* sp., leeches in the families Glossiphoniidae and Erpobdellidae, and the snails *Fossaria* sp., *Physa* sp., and *Menetus* sp. The thermal preference of the assemblage was calculated at 14.0ºC.

*c. Sediment deposition*

Four "clinger" taxa and 2 caddisfly taxa were counted: these findings suggest that there was limited access to stony substrate habitats, which could be due to sediment deposition. Nemourid stoneflies (*Malenka* sp.) were common, but not abundant;

suggesting that leaf litter and other large organic material was present, but probably not as plentiful as at some other City of Bellevue sites. The FSBI value (3.05) indicated a sediment-tolerant assemblage.

*d. Habitat diversity and integrity*

Taxa richness (30) was relatively high for a single sample from a Puget Sound Lowlands stream, suggesting moderately diverse instream habitats. Stonefly taxa richness (1), however, was low; this finding may be related to loss of streambank stability, disturbed riparian zones, or altered channel morphology. Long-lived taxa were poorly represented. Although 3 such taxa were counted, none was abundant. One semivoltine taxon (a single immature dytiscid beetle larva) is a pioneer species, and likely not a long-term resident of the site. Catastrophes such as periodic dewatering, scouring sediment pulses, or intermittent inputs of toxic pollutants cannot be ruled out. The functional composition of the benthic assemblage was dominated by filterers (especially *Simulium* sp.) and gatherers. This pattern is sometimes interpreted as evidence of water quality impairment. Scrapers were rare.

## *Newport stabilized reach d/s of swim club on 119th*

- **Bioassessment scores: 2010**

The average B-IBI score for the 3 replicates collected at this site was 17.34, indicating "poor" biological conditions. Similarly, the average RIVPACS score (0.25) also indicated impairment. The Newport samples yielded the lowest bioassessment scores among the sites in this study.

- **Indicators of ecological condition: 2010**

*a. Water quality*

The biotic index value (3.64) calculated for these samples was relatively low, implying a sensitive benthic assemblage. However, the mayfly fauna was limited to a single taxon, *Baetis tricaudatus*. In addition, other evidence suggesting impaired water quality included the overwhelming dominance by non-insect taxa, in particular the oligochaetes *Mesenchytraeus* sp. and *Lumbriculus* sp. as well as turbellarian flatworms. Non-insect taxa accounted for 77% of sampled animals. While these oligochaetes and flatworms are not particularly tolerant taxa, the abundance of these sediment-associated animals suggests that nutrient enrichment may be a stressor in this reach. The metals tolerance index value (2.82) indicates an assemblage that is not likely influenced by metals contamination.

*b. Thermal condition*

No cold stenotherm taxa were encountered, but most taxa present were cool water adapted. The thermal preference calculated for this assemblage was 15.3ºC. A notable cool-water midge, *Brundiniella eumorpha*, was collected in the samples.

*c. Sediment deposition*

Three "clinger" taxa and a single caddisfly taxon suggest that stony substrates were generally unavailable for colonization. The nemourid stonefly *Malenka* sp. was abundant, indicating that leafy debris and woody material may account for a large proportion of benthic substrates. In addition, the dominance by oligochaete taxa suggests that fine sediment may also be a large component of substrate material. The FSBI value (2.73) indicated a sediment-tolerant assemblage.

*d. Habitat diversity and integrity*

Taxa richness (27) was low in this reach, particularly considering that the collection was composed of 3 samples. Instream habitats may have been monotonous here. *Malenka* sp. was the only stonefly taxon in the samples: low diversity among stoneflies may be related to disturbance of reach-scale habitat features such as riparian zones, channel morphology, or streambanks. A single semivoltine taxon was counted: periodic dewatering, scouring sediment pulses, or other catastrophes that would interrupt long life cycles cannot be ruled out. Low abundance of midges could also indicate periodic torrential flow conditions. Gatherers, mainly the oligochaetes, dominated the functional composition of the assemblage. This pattern may imply water quality disturbances.

## *Wilkins Upstream of Bypass, at NE 8th & Northup Wy.*

- **Bioassessment scores: 2010**

A single sample was collected at this site: this sample was completely sorted in an attempt to retrieve 700 organisms. However, only 607 organisms were present in the sample. The B-IBI score calculated for the sample was 22, indicating "poor" biological conditions. The RIVPACS score (0.34) also indicated impairment.

- **Indicators of ecological condition: 2010**

*a. Water quality*

Mayflies were represented by a single taxon: the ubiquitous *Baetis tricaudatus*. The biotic index value (4.52) was higher than expected for a Puget Sound Lowlands stream. These findings suggest that water quality may have been degraded in this reach. The metals tolerance index (4.33) implied that metals contamination was not a major stressor. The preponderance of non-insects (38% of sampled animals) suggests that nutrient enrichment may impair water quality. Turbellarian flatworms and several taxa of oligochaetes were especially abundant, and blackflies (*Simulium* sp.) were also among the dominant animals in the sample.

*b. Thermal condition*

The assemblage apparently included no cold stenotherm taxa, and the thermal preference was calculated at 13.8ºC, which is among the cooler temperature preferences for sites in this study.

*c. Sediment deposition*

Four "clinger" taxa and a single caddisfly taxon were collected, suggesting limited access to stony substrates. Sediment deposition might be an important stressor here, but the nemourid stonefly *Malenka* sp. was also common, implying ample quantities of leafy and woody debris, which may obliterate inorganic substrates. The FSBI value (3.40) calculated for this sample indicates a sediment-tolerant assemblage.

*d. Habitat diversity and integrity*

Taxa richness (29) was moderately depressed here, compared to expectations for streams in the Puget Sound Lowlands. Instream habitats may have been limited or monotonous. A single stonefly taxon was collected (*Malenka* sp.), suggesting that reach-scale habitat features may have been disrupted. Unstable streambanks, loss of riparian function, or altered channel morphology may be indicated. Two semivoltine taxa were represented, but very few individuals were counted. Periodic dewatering, thermal stress, or scour cannot be ruled out. The functional composition of the assemblage was skewed, with large numbers of predatory flatworms altering the balance of feeding groups. Gatherers and filterers were very abundant, and scrapers were rare.

### *Wilkins In bypass reach, near NE 8th & Northup Wy.*

- **Bioassessment scores: 2010**

The single sample collected at this site yielded a B-IBI score (22) indicating "poor" biotic integrity. The RIVPACS score (0.34) also indicated impairment. The sample was completely sorted in an attempt to retrieve 700 organisms. However, only 564 organisms were present.

- **Indicators of ecological condition: 2010**

*a. Water quality*

A single mayfly taxon was collected at this site; this was the ubiquitous *Baetis tricaudatus*. The biotic index value (4.16) was somewhat elevated compared to expectations for a Puget Sound Lowlands stream. These findings suggest mild impairment of water quality in this reach. Other evidence of water quality degradation include the abundance of non-insects, midges, and blackfly larvae: together, these components accounted for 84% of the organisms collected here.

*b. Thermal condition*

No cold stenotherm taxa were present in the sample, and the thermal preference of the assemblage was estimated to be 14.0ºC.

*c. Sediment deposition*

Six "clinger" taxa were collected; caddisflies were apparently absent from the sampled site. Sediment deposition may have contributed to depressed colonization of stony substrate habitats. The FSBI value (2.52) indicated a sediment-tolerant assemblage. However, the shredder *Malenka* sp. was common at the site, suggesting that substrates were composed of significant leaf litter and woody debris.

*d. Habitat diversity and integrity*

Taxa richness (30) was lower than expected, suggesting that instream habitats may have been limited or monotonous. Reach-scale habitat features, such as streambank stability, riparian zone function, and channel morphology may have suffered disturbance. Low stonefly taxa richness (1) may suggest this. Long-lived taxa were underrepresented: only 2 such taxa were counted, and neither of these was common. Catastrophes such as periodically interrupted surface flow, scouring sediment pulses, or toxic pollutants cannot be ruled out here. Although all expected feeding groups were present, the functional balance was skewed toward predators, which were dominated by turbellarian flatworms. Scrapers were rare.

### *Lewis on Lakemont Blvd. at I-90 Rep 1*

- **Bioassessment scores: 2010**

The average RIVPACS score for the 3 replicates collected at this site was 0.62. Although this was the highest RIVPACS score of any site in this study, it still falls below the impairment threshold. The average B-IBI score (22.7) for these replicates indicated "poor" biotic integrity. Differences between individual replicate scores at this site for RIVPACS and the B-IBI account for much of the error associated with the correlation in Figure 3. Given the composition of the benthic assemblage and the presence of sensitive taxa, it appears that the RIVPACS analysis gives a better assessment than the B-IBI at this site.

- **Indicators of ecological condition: 2010**

*a. Water quality*

Mayfly taxa richness (4) at this site was relatively high, compared to the other sites in this study, but the biotic index value (4.58) was elevated. The biotic index value was strongly influenced by the abundance of blackfly larvae (*Simulium* sp.) and tolerant caddisflies (*Hydropsyche* sp. and immature Hydropsychidae), which accounted for 59% of sampled organisms. The presence of sensitive taxa (*Pteronarcys* sp., leuctrid

stoneflies, and *Dolophilodes* sp.) and the diverse mayfly assemblage seem to strongly support a hypothesis that water quality was relatively good in this reach. However, abundant organic material, present as fine suspended particles supported a large contingent of filter-feeders and may indicate some nutrient enrichment.

*b. Thermal condition*

The calculated thermal preference of the assemblage was 14.1ºC, but the presence of cold stenotherm taxa in the collections suggests an even colder temperature regime.

*c. Sediment deposition*

Sixteen "clinger" taxa and 7 caddisfly taxa were present in the samples collected at this site. These findings suggest that sediment deposition did not substantially limit colonization of stony substrate habitats. The FSBI value (3.54) indicated a moderately sediment-tolerant assemblage. Similar to several other sites in this study, this site supported large numbers of *Malenka* sp., a shredder. The abundance of this stonefly suggests that leaf litter and woody debris were a significant component of the benthic substrate.

*d. Habitat diversity and integrity*

Taxa richness (47) was high at this site, suggesting diverse instream habitats. At least 4 stonefly taxa were supported here: high richness in this group suggests intact reach-scale habitat features. Stable streambanks, functional riparian zones and undisrupted channel morphology may be indicated. Samples contained representatives of 5 semivoltine taxa: it seems likely that surface flow persisted year-round here. Scouring sediment pulses and intermittent inputs of toxic pollutants seem unlikely. Filterers, especially blackflies (*Simulium* sp.) and hydropsychid caddisflies (*Hydropsyche* sp.) and gatherers dominated the functional mix. Some degradation of water quality may be suggested by this functional pattern. Shredders, especially *Malenka* sp., were abundant, indicating ample inputs of large organic material from riparian sources.

## DISCUSSION

Water quality perturbations and habitat disruption were indicated at many of the stream sites in the highly urbanized watersheds of the City of Bellevue. Six of the 8 sites sampled in 2010 supported benthic invertebrate assemblages that suggested multiple sources of stress. Table 3 summarizes the stressors suggested by the analysis of the taxonomic and functional characteristics of the biotic assemblages. Water quality degradation was apparent at 6 sites, evidenced by low mayfly taxa richness and measures of assemblage tolerance. Mayfly taxa were limited at all Bellevue sites sampled in 2010: a single taxon, the ubiquitous *Baetis tricaudatus*, was the sole representative of the group at all but 1 sampled site. Only the site on Lewis Creek exhibited more diversity in this group. Water quality problems probably included nutrient enrichment. Habitat disturbance was also suggested for the majority of sites: 5 sites supported benthic assemblages that were probably limited by flow considerations, riparian zone function, channel alteration, unstable streambanks or sediment deposition.

The B-IBI and RIVPACS tools performed similarly for assemblages collected in the City of Bellevue. Correlation between the 2 methods was strong, and the ecological evidence discussed in the site-by-site narratives generally supported the results of the bioassessment tools. The Lewis Creek site was an exception which accounted for much of the error in the correlation illustrated in Figure 3: the high RIVPACS scores were a better reflection of the composition of the benthic assemblage, and appeared to be influenced by high overall diversity and the presence of relatively sensitive taxa. The lower B-IBI scores appeared to be influenced by the skewed functional composition and by lower-than-ideal mayfly taxa richness.

**Table 3.** Possible stressors, as suggested by the taxonomic and functional composition of invertebrate assemblages. City of Bellevue, 2010.

| Site | water quality degradation | sediment deposition | thermal stress | habitat disruption |
|---|---|---|---|---|
| **Goff 1** | + | ? | ? | ? |
| **Phantom 1** | | ? | | |
| **W. Trib Kelsey 1** | + | ? | ? | + |
| **Lakehurst 1** | + | + | + | + |
| **Newport 1** | + | + | | + |
| **Wilkins 1** | + | ? | | + |
| **Wilkins 2** | + | ? | | + |
| **Lewis 1** | ? | | | |

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## ADDENDUM: Taxonomic resolution and assessment results

The extra effort in taxonomic resolution (genus-level determinations for chironomids and oligochaetes) influenced the B-IBI scores and the strength of the narrative interpretations in several ways. B-IBI scores were influenced by larger counts for taxa richness, since the group that was previously identified as "Oligochaeta" was differentiated into 7 different taxa. This resulted in an inflation of taxa richness values for 13 of the 16 replicate samples. (For the 3 remaining samples, in which a single oligochaete taxon was reported, the group was represented by only a single specimen in each sample.) Inflation of taxonomic richness ranged from an increase of 1 to as many as 6 additional taxa. For 2 replicate samples (Goff rep. 1 and Newport rep. 1), inflation of the taxa richness metric value resulted in inflation of the B-IBI score, raising the score by 2 points in each case. Impairment classifications ("poor") were the same for both sites regardless of the taxonomic resolution for oligochaetes. To calculate B-IBI scores when higher taxonomic resolution was applied, the criteria designed for genus-level determinations of chironomids was used. Differences in B-IBI scores obtained using differential criteria were not examined. Identification of chironomids to genus allowed 5 additional clinger taxa, 2 additional predator taxa, and 3 additional tolerant taxa to be differentiated, influencing the outcome of 3 B-IBI metric values. Twenty-nine unique chironomid taxa were identified, accounting for more than 30% of all taxa recorded in these samples.

The narrative interpretations were influenced by the opportunity for better evaluation of functional feeding group composition, and overall sensitivity of the macroinvertebrate assemblages. In some instances (i.e. Newport replicates and the Goff sample), these analyses were of less importance because of very low numbers of chironomids in the samples. It is important to note, however, that low numbers of chironomids may be an indication of armored substrates or high incidence of scouring flows. Low numbers of midges can of course be detected whether or not the group is identified to higher taxonomic resolution.

When chironomids are left at family level, functional analysis is made more difficult by the assignment of the entire family to the collector-gatherer feeding group. This is a gross oversimplification, since midges represent diverse feeding groups; for example, the midge *Brillia* sp., which was an important component of many assemblages in City of Bellevue samples, is a shredder. Shredder taxa are important indicators of riparian contributions to energy resources in the form of large chunks of organic material such as leaves and woody debris. The relative proportion of shredders was the most important functional parameter influenced by taxonomic resolution of chironomid identifications, but only when *Brillia* sp. was abundant. Sites where *Brillia* sp. was common included Goff and Wilkins (upstream of bypass). In addition, *Brillia* sp. was common in one of the Lewis Creek replicates. In most cases, the contribution of *Brillia* sp. to shredder proportions was blunted by large numbers of stonefly shredders. Detecting large numbers of this midge may be important at locations where thermal conditions or water quality prevent the occurrence of the nemourid stoneflies.

In systems with nutrient enrichment or warm water temperatures, and in particular when both stressors are present, low dissolved oxygen levels may severely impair biotic

health. The incidence of hemoglobin-bearing taxa is an important indicator of hypoxic conditions. Many hemoglobin-bearing taxa are found among the chironomids and the oligochaetes, and when these groups are not identified to genus levels, the incidence of hemoglobin-bearing taxa can be underestimated. A few snail taxa are hemoglobin-bearers, but snails are uncommon at many sites in the City of Bellevue. In the current study, 4 hemoglobin-bearing chironomid taxa were identified. When midges and oligochaetes are left at lower resolution, hemoglobin-bearing taxa are reported in 3 of the 16 replicate samples; however, when higher resolution is attained, it becomes apparent that hemoglobin-bearing taxa occur in 11 of the 16 replicates. In this study, none of these midges were common enough to suggest that low oxygen conditions significantly stressed macroinvertebrate assemblages, but tracking their abundance may provide a valuable bellwether. No hemoglobin-bearing oligochaete taxa were identified. Instead, the oligochaetes at these sites were mainly members of the family Enchytraeidae (*Enchytraeus* sp., *Mesenchytraeus* sp., *Fridericia* sp.). This family is generally considered to be much less tolerant than other oligochaete groups, such as Tubificinae. Where the enchytraeid oligochaetes were abundant, especially the Newport site, this relative sensitivity strongly influenced the biotic index calculation.

The biotic index value was also strongly influenced by different taxonomic resolution for midges and worms. Chironomids are collectively assigned a high biotic index value, following the assumption that midges are tolerant. However, the family is diverse in terms of the relative sensitivity of its members to pollution, thermal stress, and oxygenation. For all sample replicates, biotic index values indicated greater assemblage sensitivity when higher taxonomic resolution was applied to the analysis. The following table summarizes these differences. The metals tolerance index was much less strongly influenced by the taxonomic resolution.

The influence of higher taxonomic resolution for midges and worms on the cost of sample processing was an increase of $16 per sample over costs for lower resolution.

| RAI Sample ID | Abbreviated station name and replicate number | Biotic index value: low taxonomic resolution | Biotic index value: higher taxonomic resolution |
|---|---|---|---|
| CB10LD001 | Goff 1 | 6.09 | 5.20 |
| CB10LD002 | Goff 2 | 7.08 | 5.10 |
| CB10LD003 | Goff 3 | 5.65 | 4.92 |
| CB10LD004 | Phantom 1 | 3.34 | 2.80 |
| CB10LD005 | W. Trib Kelsey 1 | 5.49 | 4.16 |
| CB10LD006 | W. Trib Kelsey 2 | 6.95 | 4.33 |
| CB10LD007 | W. Trib Kelsey 3 | 6.68 | 3.84 |
| CB10LD008 | Lakehurst 1 | 5.79 | 4.90 |
| CB10LD009 | Newport 1 | 7.04 | 3.53 |
| CB10LD010 | Newport 2 | 7.48 | 3.64 |
| CB10LD011 | Newport 3 | 7.62 | 3.76 |
| CB10LD012 | Wilkins 1 | 5.93 | 4.52 |
| CB10LD013 | Wilkins 2 | 5.25 | 4.16 |
| CB10LD014 | Lewis 1 | 5.62 | 5.19 |
| CB10LD015 | Lewis 2 | 5.56 | 5.03 |
| CB10LD016 | Lewis 3 | 3.74 | 3.56 |

# APPENDIX

## Taxa lists and metric summaries for composite samples

## City of Bellevue, Washington

## 2010

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD001

**RAI No.:** CB10LD001
**Client ID:** Goff 1
**Date Coll.:** 8/10/2010 **No. Jars:** 1
**Sta. Name:** Goff Creek just upstream of confluence w/ West Trib Rep 1
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 12 | 3.42% | Yes | Unknown | | 5 | PR |
| Nematoda | 14 | 3.99% | Yes | Unknown | | 5 | PA |
| Turbellaria | 3 | 0.85% | Yes | Unknown | | 4 | PR |
| Enchytraeidae | | | | | | | |
| *Fridericia* sp. | 2 | 0.57% | Yes | Unknown | | 11 | CG |
| Hyalellidae | | | | | | | |
| *Hyalella* sp. | 9 | 2.56% | Yes | Unknown | | 8 | CG |
| Lumbriculidae | | | | | | | |
| Lumbriculidae | 1 | 0.28% | No | Immature | | 4 | CG |
| *Lumbriculus* sp. | 1 | 0.28% | Yes | Unknown | | 4 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis* sp. | 15 | 4.27% | Yes | Larva | Damaged | 5 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 28 | 7.98% | Yes | Larva | | 1 | SH |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Narpus concolor* | 6 | 1.71% | Yes | Larva | | 2 | CG |
| Hydrophilidae | | | | | | | |
| Hydrophilidae | 1 | 0.28% | Yes | Larva | | 5 | PR |
| **Diptera** | | | | | | | |
| Dixidae | | | | | | | |
| *Dixa* sp. | 1 | 0.28% | Yes | Larva | | 1 | CG |
| Empididae | | | | | | | |
| Empididae | 1 | 0.28% | No | Pupa | | 6 | PR |
| *Neoplasta* sp. | 1 | 0.28% | Yes | Larva | | 5 | PR |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 195 | 55.56% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 6 | 1.71% | No | Pupa | | 6 | CF |
| Tipulidae | | | | | | | |
| *Tipula* sp. | 1 | 0.28% | Yes | Larva | | 4 | SH |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 24 | 6.84% | Yes | Larva | | 4 | SH |
| *Eukiefferiella* sp. | 5 | 1.42% | Yes | Larva | | 8 | CG |
| *Metriocnemus* sp. | 1 | 0.28% | Yes | Larva | | 6 | OM |
| Orthocladiinae | 2 | 0.57% | No | Pupa | Damaged | 6 | CG |
| *Pagastia* sp. | 3 | 0.85% | Yes | Larva | | 1 | CG |
| *Parametriocnemus* sp. | 2 | 0.57% | Yes | Larva | | 5 | CG |
| *Tvetenia* sp. | 17 | 4.84% | Yes | Larva | | 5 | CG |
| **Sample Count** | **351** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD002

**RAI No.:** CB10LD002
**Client ID:** Goff 2
**Date Coll.:** 8/10/2010 **No. Jars:** 2
**Sta. Name:** Goff Creek just upstream of confluence w/ West Trib Rep 2
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Nematoda | 6 | 1.14% | Yes | Unknown | | 5 | PA |
| Turbellaria | 4 | 0.76% | Yes | Unknown | | 4 | PR |
| Enchytraeidae | | | | | | | |
| *Mesenchytraeus* sp. | 4 | 0.76% | Yes | Unknown | | 4 | CG |
| Hyalellidae | | | | | | | |
| *Hyalella* sp. | 52 | 9.87% | Yes | Unknown | | 8 | CG |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 113 | 21.44% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - with capillary setae | 1 | 0.19% | Yes | Immature | | 11 | CG |
| Sphaeriidae | | | | | | | |
| Sphaeriidae | 11 | 2.09% | Yes | Unknown | | 8 | CF |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 26 | 4.93% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 37 | 7.02% | Yes | Larva | | 1 | SH |
| *Zapada cinctipes* | 13 | 2.47% | Yes | Larva | | 3 | SH |
| **Trichoptera** | | | | | | | |
| Hydropsychidae | | | | | | | |
| Hydropsychidae | 1 | 0.19% | Yes | Larva | Early Instar | 4 | CF |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Narpus concolor* | 1 | 0.19% | Yes | Larva | | 2 | CG |
| **Diptera** | | | | | | | |
| Psychodidae | | | | | | | |
| Psychodidae | 1 | 0.19% | Yes | Pupa | | 4 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 189 | 35.86% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 1 | 0.19% | No | Pupa | | 6 | CF |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD002

**RAI No.:** CB10LD002
**Client ID:** Goff 2
**Date Coll.:** 8/10/2010 **No. Jars:** 2
**Sta. Name:** Goff Creek just upstream of confluence w/ West Trib Rep 2
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 23 | 4.36% | Yes | Larva | | 4 | SH |
| *Corynoneura* sp. | 2 | 0.38% | Yes | Larva | | 7 | CG |
| *Eukiefferiella* sp. | 4 | 0.76% | Yes | Larva | | 8 | CG |
| *Eukiefferiella* sp. | 1 | 0.19% | No | Pupa | | 8 | CG |
| *Limnophyes* sp. | 1 | 0.19% | Yes | Larva | | 8 | CG |
| *Metriocnemus* sp. | 2 | 0.38% | Yes | Larva | | 6 | OM |
| *Micropsectra* sp. | 2 | 0.38% | Yes | Larva | | 4 | CG |
| *Parametriocnemus* sp. | 1 | 0.19% | Yes | Larva | | 5 | CG |
| *Polypedilum* sp. | 2 | 0.38% | Yes | Larva | | 6 | SH |
| *Prodiamesa* sp. | 1 | 0.19% | Yes | Larva | | 3 | CG |
| Tanytarsini | 1 | 0.19% | No | Larva | Early Instar | 6 | CF |
| *Tvetenia* sp. | 26 | 4.93% | Yes | Larva | | 5 | CG |
| *Tvetenia* sp. | 1 | 0.19% | No | Pupa | | 5 | CG |
| **Sample Count** | **527** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD003

**RAI No.:** CB10LD003
**Client ID:** Goff 3
**Date Coll.:** 8/10/2010 **No. Jars:** 1
**Sta. Name:** Goff Creek just upstream of confluence w/ West Trib Rep 3
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Nematoda | 47 | 9.40% | Yes | Unknown | | 5 | PA |
| Enchytraeidae | | | | | | | |
| *Fridericia* sp. | 3 | 0.60% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 3 | 0.60% | Yes | Unknown | | 4 | CG |
| Hyalellidae | | | | | | | |
| *Hyalella* sp. | 37 | 7.40% | Yes | Unknown | | 8 | CG |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 39 | 7.80% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - without capillary setae | 3 | 0.60% | Yes | Immature | | 11 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 109 | 21.80% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 34 | 6.80% | Yes | Larva | | 1 | SH |
| *Zapada cinctipes* | 18 | 3.60% | Yes | Larva | | 3 | SH |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Narpus concolor* | 3 | 0.60% | Yes | Larva | | 2 | CG |
| **Diptera** | | | | | | | |
| Dixidae | | | | | | | |
| *Dixa* sp. | 1 | 0.20% | Yes | Larva | | 1 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 183 | 36.60% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 1 | 0.20% | No | Pupa | | 6 | CF |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Eukiefferiella* sp. | 5 | 1.00% | Yes | Larva | | 8 | CG |
| *Metriocnemus* sp. | 1 | 0.20% | Yes | Larva | | 6 | OM |
| *Micropsectra* sp. | 4 | 0.80% | Yes | Larva | | 4 | CG |
| *Pagastia* sp. | 4 | 0.80% | Yes | Larva | | 1 | CG |
| *Parametriocnemus* sp. | 2 | 0.40% | Yes | Larva | | 5 | CG |
| *Phaenopsectra* sp. | 2 | 0.40% | Yes | Larva | | 7 | SC |
| *Tvetenia* sp. | 1 | 0.20% | Yes | Larva | | 5 | CG |
| **Sample Count** | **500** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD004

**RAI No.:** CB10LD004
**Client ID:** Phantom 1
**Date Coll.:** 8/30/2010 **No. Jars:** 2
**Sta. Name:** Lower Phantom, just upstream of W Lk Samm in Weowna Park
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Nematoda | 2 | 0.37% | Yes | Unknown | | 5 | PA |
| Turbellaria | 12 | 2.24% | Yes | Unknown | | 4 | PR |
| Enchytraeidae | | | | | | | |
| *Enchytraeus* sp. | 1 | 0.19% | Yes | Unknown | | 4 | CG |
| *Fridericia* sp. | 1 | 0.19% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 3 | 0.56% | Yes | Unknown | | 4 | CG |
| Lumbriculidae | | | | | | | |
| Lumbriculidae | 8 | 1.50% | No | Immature | | 4 | CG |
| *Lumbriculus* sp. | 8 | 1.50% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - with capillary setae | 1 | 0.19% | Yes | Immature | | 11 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 123 | 22.99% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Chloroperlidae | | | | | | | |
| Chloroperlidae | 2 | 0.37% | No | Larva | Early Instar | 1 | PR |
| *Sweltsa* sp. | 81 | 15.14% | Yes | Larva | | 0 | PR |
| Leuctridae | | | | | | | |
| Leuctridae | 8 | 1.50% | Yes | Larva | Early Instar | 0 | SH |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 72 | 13.46% | Yes | Larva | | 1 | SH |
| *Zapada cinctipes* | 18 | 3.36% | Yes | Larva | | 3 | SH |
| **Trichoptera** | | | | | | | |
| Glossosomatidae | | | | | | | |
| *Glossosoma* sp. | 29 | 5.42% | Yes | Larva | | 0 | SC |
| Hydropsychidae | | | | | | | |
| Hydropsychidae | 2 | 0.37% | No | Pupa | | 4 | CF |
| *Parapsyche almota* | 16 | 2.99% | Yes | Larva | | 3 | PR |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Lara* sp. | 3 | 0.56% | Yes | Larva | | 1 | SH |
| Hydraenidae | | | | | | | |
| *Hydraena* sp. | 2 | 0.37% | Yes | Adult | | 5 | PR |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD004

**RAI No.:** CB10LD004
**Client ID:** Phantom 1
**Date Coll.:** 8/30/2010 **No. Jars:** 2
**Sta. Name:** Lower Phantom, just upstream of W Lk Samm in Weowna Park
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Diptera** | | | | | | | |
| Ceratopogonidae | | | | | | | |
| Forcipomyiinae | 2 | 0.37% | Yes | Larva | | 6 | PR |
| Dixidae | | | | | | | |
| *Dixa* sp. | 26 | 4.86% | Yes | Larva | | 1 | CG |
| Dixidae | 1 | 0.19% | No | Pupa | | 4 | CG |
| Empididae | | | | | | | |
| *Neoplasta* sp. | 2 | 0.37% | Yes | Larva | | 5 | PR |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 65 | 12.15% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 6 | 1.12% | No | Pupa | | 6 | CF |
| Tipulidae | | | | | | | |
| *Dicranota* sp. | 8 | 1.50% | Yes | Larva | | 3 | PR |
| *Tipula* sp. | 2 | 0.37% | Yes | Larva | | 4 | SH |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 1 | 0.19% | Yes | Larva | | 4 | SH |
| *Corynoneura* sp. | 1 | 0.19% | Yes | Larva | | 7 | CG |
| *Eukiefferiella* sp. | 2 | 0.37% | Yes | Larva | | 8 | CG |
| *Krenosmittia* sp. | 1 | 0.19% | No | Pupa | | 1 | CG |
| *Krenosmittia* sp. | 1 | 0.19% | Yes | Larva | | 1 | CG |
| *Limnophyes* sp. | 1 | 0.19% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 1 | 0.19% | Yes | Larva | | 4 | CG |
| *Parametriocnemus* sp. | 18 | 3.36% | Yes | Larva | | 5 | CG |
| *Tvetenia* sp. | 5 | 0.93% | Yes | Larva | | 5 | CG |
| **Sample Count** | **535** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD005

**RAI No.:** CB10LD005 **Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 1
**Client ID:** W. Trib Kelsey 1
**Date Coll.:** 8/24/2010 **No. Jars:** 1 **STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 4 | 0.77% | Yes | Unknown | | 5 | PR |
| Nematoda | 7 | 1.34% | Yes | Unknown | | 5 | PA |
| Turbellaria | 1 | 0.19% | Yes | Unknown | | 4 | PR |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 28 | 5.36% | Yes | Unknown | | 6 | CG |
| Enchytraeidae | | | | | | | |
| *Fridericia* sp. | 1 | 0.19% | Yes | Unknown | | 11 | CG |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 1 | 0.19% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - without capillary setae | 1 | 0.19% | Yes | Immature | | 11 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 123 | 23.56% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 91 | 17.43% | Yes | Larva | | 1 | SH |
| Nemouridae | 10 | 1.92% | No | Larva | Early Instar | 2 | SH |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Narpus concolor* | 1 | 0.19% | Yes | Larva | | 2 | CG |
| **Diptera** | | | | | | | |
| Empididae | | | | | | | |
| Empididae | 1 | 0.19% | No | Pupa | | 6 | PR |
| *Hemerodromia* sp. | 1 | 0.19% | Yes | Larva | | 6 | PR |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 97 | 18.58% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 14 | 2.68% | No | Pupa | | 6 | CF |
| Tipulidae | | | | | | | |
| *Antocha* sp. | 3 | 0.57% | Yes | Larva | | 3 | CG |
| *Dicranota* sp. | 9 | 1.72% | Yes | Larva | | 3 | PR |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD005

**RAI No.:** CB10LD005 **Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 1
**Client ID:** W. Trib Kelsey 1
**Date Coll.:** 8/24/2010 **No. Jars:** 1 **STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 2 | 0.38% | Yes | Larva | | 4 | SH |
| *Cricotopus* sp. | 1 | 0.19% | Yes | Pupa | | 7 | SH |
| *Eukiefferiella* sp. | 14 | 2.68% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 40 | 7.66% | Yes | Larva | | 4 | CG |
| *Micropsectra* sp. | 2 | 0.38% | No | Pupa | | 4 | CG |
| *Pagastia* sp. | 13 | 2.49% | Yes | Larva | | 1 | CG |
| *Parametriocnemus* sp. | 4 | 0.77% | Yes | Larva | | 5 | CG |
| *Rheotanytarsus* sp. | 2 | 0.38% | No | Pupa | | 6 | CF |
| *Rheotanytarsus* sp. | 27 | 5.17% | Yes | Larva | | 6 | CF |
| *Synorthocladius* sp. | 1 | 0.19% | No | Pupa | | 2 | CG |
| *Synorthocladius* sp. | 3 | 0.57% | Yes | Larva | | 2 | CG |
| Tanytarsini | 1 | 0.19% | No | Larva | Damaged | 6 | CF |
| *Tvetenia* sp. | 19 | 3.64% | Yes | Larva | | 5 | CG |
| **Sample Count** | **522** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD006

**RAI No.:** CB10LD006 **Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 2
**Client ID:** W. Trib Kelsey 2
**Date Coll.:** 8/24/2010 **No. Jars:** 1 **STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 9 | 1.73% | Yes | Unknown | | 5 | PR |
| Copepoda | 1 | 0.19% | Yes | Unknown | | 8 | CG |
| Nematoda | 41 | 7.88% | Yes | Unknown | | 5 | PA |
| Turbellaria | 8 | 1.54% | Yes | Unknown | | 4 | PR |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 30 | 5.77% | Yes | Unknown | | 6 | CG |
| Enchytraeidae | | | | | | | |
| *Mesenchytraeus* sp. | 1 | 0.19% | Yes | Unknown | | 4 | CG |
| Erpobdellidae | | | | | | | |
| Erpobdellidae | 1 | 0.19% | Yes | Unknown | | 8 | PR |
| Sphaeriidae | | | | | | | |
| Sphaeriidae | 3 | 0.58% | Yes | Unknown | | 8 | CF |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 73 | 14.04% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 54 | 10.38% | Yes | Larva | | 1 | SH |
| **Trichoptera** | | | | | | | |
| Hydropsychidae | | | | | | | |
| Hydropsychidae | 1 | 0.19% | Yes | Larva | Early Instar | 4 | CF |
| Hydroptilidae | | | | | | | |
| *Hydroptila* sp. | 1 | 0.19% | Yes | Larva | | 6 | PH |
| Lepidostomatidae | | | | | | | |
| *Lepidostoma* sp. | 1 | 0.19% | Yes | Larva | | 1 | SH |
| **Diptera** | | | | | | | |
| Psychodidae | | | | | | | |
| *Pericoma* sp. | 1 | 0.19% | Yes | Larva | | 4 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 43 | 8.27% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 1 | 0.19% | No | Pupa | | 6 | CF |
| Tipulidae | | | | | | | |
| *Antocha* sp. | 4 | 0.77% | Yes | Larva | | 3 | CG |
| *Dicranota* sp. | 1 | 0.19% | Yes | Larva | | 3 | PR |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD006

**RAI No.:** CB10LD006 **Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 2
**Client ID:** W. Trib Kelsey 2
**Date Coll.:** 8/24/2010 **No. Jars:** 1 **STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Cricotopus* sp. | 4 | 0.77% | Yes | Larva | | 7 | SH |
| *Eukiefferiella* sp. | 13 | 2.50% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 134 | 25.77% | Yes | Larva | | 4 | CG |
| *Micropsectra* sp. | 2 | 0.38% | No | Pupa | | 4 | CG |
| *Microtendipes* sp. | 3 | 0.58% | Yes | Larva | | 6 | CF |
| *Orthocladius* sp. | 3 | 0.58% | Yes | Larva | | 6 | CG |
| *Pagastia* sp. | 19 | 3.65% | Yes | Larva | | 1 | CG |
| *Parametriocnemus* sp. | 3 | 0.58% | Yes | Larva | | 5 | CG |
| *Rheotanytarsus* sp. | 27 | 5.19% | Yes | Larva | | 6 | CF |
| *Rheotanytarsus* sp. | 3 | 0.58% | No | Pupa | | 6 | CF |
| *Synorthocladius* sp. | 1 | 0.19% | Yes | Pupa | | 2 | CG |
| Tanytarsini | 4 | 0.77% | No | Larva | Early Instar | 6 | CF |
| *Thienemanniella* sp. | 2 | 0.38% | Yes | Larva | | 6 | CG |
| Thienemannimyia Gr. | 2 | 0.38% | Yes | Larva | | 5 | PR |
| *Tvetenia* sp. | 25 | 4.81% | Yes | Larva | | 5 | CG |
| *Tvetenia* sp. | 1 | 0.19% | No | Pupa | | 5 | CG |
| **Sample Count** | **520** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD007

**RAI No.:** CB10LD007 **Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 3
**Client ID:** W. Trib Kelsey 3
**Date Coll.:** 8/24/2010 **No. Jars:** 2 **STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 3 | 0.56% | Yes | Unknown | | 5 | PR |
| Nematoda | 2 | 0.38% | Yes | Unknown | | 5 | PA |
| Turbellaria | 1 | 0.19% | Yes | Unknown | | 4 | PR |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 11 | 2.07% | Yes | Unknown | | 6 | CG |
| Erpobdellidae | | | | | | | |
| Erpobdellidae | 1 | 0.19% | Yes | Unknown | | 8 | PR |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - without capillary setae | 1 | 0.19% | Yes | Immature | | 11 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 81 | 15.25% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 122 | 22.98% | Yes | Larva | | 1 | SH |
| **Trichoptera** | | | | | | | |
| Hydropsychidae | | | | | | | |
| Hydropsychidae | 1 | 0.19% | Yes | Larva | Early Instar | 4 | CF |
| **Diptera** | | | | | | | |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 11 | 2.07% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 6 | 1.13% | No | Pupa | | 6 | CF |
| Tipulidae | | | | | | | |
| *Antocha* sp. | 1 | 0.19% | No | Pupa | | 3 | CG |
| *Antocha* sp. | 3 | 0.56% | Yes | Larva | | 3 | CG |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 2 | 0.38% | Yes | Larva | | 4 | SH |
| *Eukiefferiella* sp. | 20 | 3.77% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 147 | 27.68% | Yes | Larva | | 4 | CG |
| *Orthocladius* sp. | 4 | 0.75% | Yes | Larva | | 6 | CG |
| *Pagastia* sp. | 13 | 2.45% | Yes | Larva | | 1 | CG |
| *Parametriocnemus* sp. | 2 | 0.38% | Yes | Larva | | 5 | CG |
| *Rheotanytarsus* sp. | 63 | 11.86% | Yes | Larva | | 6 | CF |
| *Rheotanytarsus* sp. | 2 | 0.38% | No | Pupa | | 6 | CF |
| Tanytarsini | 2 | 0.38% | No | Larva | Damaged | 6 | CF |
| *Thienemanniella* sp. | 1 | 0.19% | Yes | Larva | | 6 | CG |
| *Thienemanniella* sp. | 1 | 0.19% | No | Pupa | | 6 | CG |
| Thienemannimyia Gr. | 2 | 0.38% | Yes | Larva | | 5 | PR |
| *Tvetenia* sp. | 28 | 5.27% | Yes | Larva | | 5 | CG |
| **Sample Count** | **531** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD008

**RAI No.:** CB10LD008
**Client ID:** Lakehurst 1
**Date Coll.:** 8/27/2010 **No. Jars:** 2
**Sta. Name:** Lakehurst just upstream of pond, E of I405
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 1 | 0.19% | Yes | Unknown | | 5 | PR |
| Nematoda | 5 | 0.95% | Yes | Unknown | | 5 | PA |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 92 | 17.56% | Yes | Unknown | | 6 | CG |
| Enchytraeidae | | | | | | | |
| *Enchytraeus* sp. | 4 | 0.76% | Yes | Unknown | | 4 | CG |
| *Fridericia* sp. | 9 | 1.72% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 1 | 0.19% | Yes | Unknown | | 4 | CG |
| Erpobdellidae | | | | | | | |
| Erpobdellidae | 1 | 0.19% | Yes | Unknown | | 8 | PR |
| Glossiphoniidae | | | | | | | |
| Glossiphoniidae | 3 | 0.57% | Yes | Unknown | | 9 | PR |
| Lumbriculidae | | | | | | | |
| Lumbriculidae | 1 | 0.19% | No | Immature | | 4 | CG |
| *Lumbriculus* sp. | 7 | 1.34% | Yes | Unknown | | 4 | CG |
| Lymnaeidae | | | | | | | |
| *Fossaria* sp. | 1 | 0.19% | Yes | Unknown | | 6 | SC |
| Naididae | | | | | | | |
| *Nais* sp. | 1 | 0.19% | Yes | Unknown | | 8 | CG |
| Physidae | | | | | | | |
| Physidae | 2 | 0.38% | Yes | Unknown | | 8 | SC |
| Planorbidae | | | | | | | |
| *Menetus* sp. | 3 | 0.57% | Yes | Unknown | | 6 | SC |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 37 | 7.06% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 45 | 8.59% | Yes | Larva | | 1 | SH |
| **Trichoptera** | | | | | | | |
| Hydropsychidae | | | | | | | |
| *Parapsyche almota* | 19 | 3.63% | Yes | Larva | | 3 | PR |
| Rhyacophilidae | | | | | | | |
| *Rhyacophila grandis* | 1 | 0.19% | Yes | Larva | | 1 | PR |
| **Coleoptera** | | | | | | | |
| Dytiscidae | | | | | | | |
| Dytiscidae | 1 | 0.19% | Yes | Larva | | 5 | PR |
| Elmidae | | | | | | | |
| *Lara* sp. | 2 | 0.38% | Yes | Larva | | 1 | SH |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD008

**RAI No.:** CB10LD008
**Sta. Name:** Lakehurst just upstream of pond, E of I405
**Client ID:** Lakehurst 1
**Date Coll.:** 8/27/2010
**No. Jars:** 2
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Diptera** | | | | | | | |
| Dixidae | | | | | | | |
| *Dixa* sp. | 11 | 2.10% | Yes | Larva | | 1 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 8 | 1.53% | No | Pupa | | 6 | CF |
| *Simulium* sp. | 175 | 33.40% | Yes | Larva | | 6 | CF |
| Tipulidae | | | | | | | |
| *Dicranota* sp. | 4 | 0.76% | Yes | Larva | | 3 | PR |
| *Tipula* sp. | 22 | 4.20% | Yes | Larva | | 4 | SH |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 1 | 0.19% | Yes | Larva | | 4 | SH |
| *Corynoneura* sp. | 2 | 0.38% | Yes | Larva | | 7 | CG |
| *Diplocladius cultriger* | 1 | 0.19% | Yes | Larva | | 8 | CG |
| *Eukiefferiella* sp. | 1 | 0.19% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 7 | 1.34% | Yes | Larva | | 4 | CG |
| *Parametriocnemus* sp. | 51 | 9.73% | Yes | Larva | | 5 | CG |
| *Tvetenia* sp. | 5 | 0.95% | Yes | Larva | | 5 | CG |
| **Sample Count** | **524** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD009

**RAI No.:** CB10LD009
**Client ID:** Newport 1
**Date Coll.:** 8/18/2010 **No. Jars:** 1
**Sta. Name:** Newport stabilized reach d/s of swim club on 119th Rep 1
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 4 | 0.80% | Yes | Unknown | | 5 | PR |
| Nematoda | 6 | 1.20% | Yes | Unknown | | 5 | PA |
| Turbellaria | 47 | 9.40% | Yes | Unknown | | 4 | PR |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 19 | 3.80% | Yes | Unknown | | 6 | CG |
| Enchytraeidae | | | | | | | |
| *Enchytraeus* sp. | 5 | 1.00% | Yes | Unknown | | 4 | CG |
| *Fridericia* sp. | 4 | 0.80% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 253 | 50.60% | Yes | Unknown | | 4 | CG |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 20 | 4.00% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - with capillary setae | 1 | 0.20% | Yes | Immature | | 11 | CG |
| Naididae (Tubificinae) - without capillary setae | 4 | 0.80% | Yes | Immature | | 11 | CG |
| Sphaeriidae | | | | | | | |
| Sphaeriidae | 2 | 0.40% | Yes | Unknown | | 8 | CF |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 14 | 2.80% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 101 | 20.20% | Yes | Larva | | 1 | SH |
| **Diptera** | | | | | | | |
| Ceratopogonidae | | | | | | | |
| Ceratopogoninae | 1 | 0.20% | Yes | Larva | | 6 | PR |
| Dixidae | | | | | | | |
| *Dixa* sp. | 3 | 0.60% | Yes | Larva | | 1 | CG |
| Psychodidae | | | | | | | |
| *Pericoma* sp. | 1 | 0.20% | Yes | Larva | | 4 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 4 | 0.80% | Yes | Larva | | 6 | CF |
| Tipulidae | | | | | | | |
| *Tipula* sp. | 4 | 0.80% | Yes | Larva | | 4 | SH |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brundiniella eumorpha* | 2 | 0.40% | Yes | Larva | | 8 | PR |
| *Chaetocladius* sp. | 1 | 0.20% | Yes | Larva | | 6 | CG |
| *Paraphaenocladius* sp. | 1 | 0.20% | Yes | Larva | | 4 | CG |
| *Polypedilum* sp. | 2 | 0.40% | Yes | Larva | | 6 | SH |
| *Tvetenia* sp. | 1 | 0.20% | Yes | Larva | | 5 | CG |
| **Sample Count** | **500** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD010

**RAI No.:** CB10LD010
**Client ID:** Newport 2
**Date Coll.:** 8/18/2010 **No. Jars:** 1
**Sta. Name:** Newport stabilized reach d/s of swim club on 119th Rep 2
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Nematoda | 4 | 0.80% | Yes | Unknown | | 5 | PA |
| Turbellaria | 42 | 8.37% | Yes | Unknown | | 4 | PR |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 22 | 4.38% | Yes | Unknown | | 6 | CG |
| Enchytraeidae | | | | | | | |
| *Fridericia* sp. | 10 | 1.99% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 194 | 38.65% | Yes | Unknown | | 4 | CG |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 99 | 19.72% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - with capillary setae | 1 | 0.20% | Yes | Immature | | 11 | CG |
| Naididae (Tubificinae) - without capillary setae | 15 | 2.99% | Yes | Immature | | 11 | CG |
| Sphaeriidae | | | | | | | |
| Sphaeriidae | 5 | 1.00% | Yes | Unknown | | 8 | CF |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 27 | 5.38% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 78 | 15.54% | Yes | Larva | | 1 | SH |
| **Diptera** | | | | | | | |
| Dixidae | | | | | | | |
| *Dixa* sp. | 2 | 0.40% | Yes | Larva | | 1 | CG |
| Tipulidae | | | | | | | |
| *Tipula* sp. | 2 | 0.40% | Yes | Larva | | 4 | SH |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Parametriocnemus* sp. | 1 | 0.20% | Yes | Larva | | 5 | CG |
| **Sample Count** | **502** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD011

**RAI No.:** CB10LD011
**Client ID:** Newport 3
**Date Coll.:** 8/18/2010 **No. Jars:** 1
**Sta. Name:** Newport stabilized reach d/s of swim club on 119th Rep 3
**STORET ID:** 500 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Nematoda | 1 | 0.20% | Yes | Unknown | | 5 | PA |
| Turbellaria | 71 | 14.20% | Yes | Unknown | | 4 | PR |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 13 | 2.60% | Yes | Unknown | | 6 | CG |
| Enchytraeidae | | | | | | | |
| *Enchytraeus* sp. | 7 | 1.40% | Yes | Unknown | | 4 | CG |
| *Fridericia* sp. | 5 | 1.00% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 198 | 39.60% | Yes | Unknown | | 4 | CG |
| Erpobdellidae | | | | | | | |
| Erpobdellidae | 2 | 0.40% | Yes | Unknown | | 8 | PR |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 94 | 18.80% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - with capillary setae | 2 | 0.40% | Yes | Immature | | 11 | CG |
| Naididae (Tubificinae) - without capillary setae | 10 | 2.00% | Yes | Immature | | 11 | CG |
| Sphaeriidae | | | | | | | |
| Sphaeriidae | 2 | 0.40% | Yes | Unknown | | 8 | CF |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 34 | 6.80% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 53 | 10.60% | Yes | Larva | | 1 | SH |
| **Trichoptera** | | | | | | | |
| Hydropsychidae | | | | | | | |
| *Parapsyche almota* | 2 | 0.40% | Yes | Larva | | 3 | PR |
| **Diptera** | | | | | | | |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 1 | 0.20% | Yes | Larva | | 6 | CF |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 2 | 0.40% | Yes | Larva | | 4 | SH |
| *Paraphaenocladius* sp. | 2 | 0.40% | Yes | Larva | | 4 | CG |
| *Tvetenia* sp. | 1 | 0.20% | Yes | Larva | | 5 | CG |
| **Sample Count** | **500** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD012

**RAI No.:** CB10LD012
**Client ID:** Wilkins 1
**Date Coll.:** 8/30/2010 **No. Jars:** 2
**Sta. Name:** Wilkins Upstream of Bypass, at NE 8th & Northup Wy.
**STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 16 | 2.64% | Yes | Unknown | | 5 | PR |
| Turbellaria | 145 | 23.89% | Yes | Unknown | | 4 | PR |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 2 | 0.33% | Yes | Unknown | | 6 | CG |
| Enchytraeidae | | | | | | | |
| *Enchytraeus* sp. | 16 | 2.64% | Yes | Unknown | | 4 | CG |
| *Fridericia* sp. | 7 | 1.15% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 19 | 3.13% | Yes | Unknown | | 4 | CG |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 21 | 3.46% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| Naididae (Tubificinae) - without capillary setae | 4 | 0.66% | Yes | Immature | | 11 | CG |
| Planorbidae | | | | | | | |
| *Promenetus* sp. | 1 | 0.16% | Yes | Unknown | | 6 | SC |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 82 | 13.51% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 42 | 6.92% | Yes | Larva | | 1 | SH |
| **Trichoptera** | | | | | | | |
| Limnephilidae | | | | | | | |
| Limnephilidae | 1 | 0.16% | Yes | Pupa | | 3 | SH |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Lara* sp. | 2 | 0.33% | Yes | Larva | | 1 | SH |
| **Diptera** | | | | | | | |
| Ceratopogonidae | | | | | | | |
| Forcipomyiinae | 6 | 0.99% | Yes | Larva | | 6 | PR |
| Culicidae | | | | | | | |
| Culicidae | 1 | 0.16% | Yes | Pupa | | 10 | CG |
| Dixidae | | | | | | | |
| *Dixa* sp. | 5 | 0.82% | Yes | Larva | | 1 | CG |
| Empididae | | | | | | | |
| Empididae | 1 | 0.16% | No | Pupa | | 6 | PR |
| *Neoplasta* sp. | 4 | 0.66% | Yes | Larva | | 5 | PR |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 98 | 16.14% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 22 | 3.62% | No | Pupa | | 6 | CF |
| Thaumaleidae | | | | | | | |
| Thaumaleidae | 4 | 0.66% | Yes | Larva | | 11 | OM |
| Tipulidae | | | | | | | |
| *Tipula* sp. | 4 | 0.66% | Yes | Larva | | 4 | SH |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD012

**RAI No.:** CB10LD012
**Client ID:** Wilkins 1
**Date Coll.:** 8/30/2010
**No. Jars:** 2
**Sta. Name:** Wilkins Upstream of Bypass, at NE 8th & Northup Wy.
**STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 15 | 2.47% | Yes | Larva | | 4 | SH |
| *Corynoneura* sp. | 3 | 0.49% | Yes | Larva | | 7 | CG |
| *Diplocladius cultriger* | 2 | 0.33% | Yes | Larva | | 8 | CG |
| *Eukiefferiella* sp. | 1 | 0.16% | No | Pupa | | 8 | CG |
| *Eukiefferiella* sp. | 19 | 3.13% | Yes | Larva | | 8 | CG |
| *Limnophyes* sp. | 2 | 0.33% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 6 | 0.99% | Yes | Larva | | 4 | CG |
| *Microtendipes* sp. | 9 | 1.48% | Yes | Larva | | 6 | CF |
| Orthocladiinae | 2 | 0.33% | No | Larva | Early Instar | 6 | CG |
| *Parametriocnemus* sp. | 23 | 3.79% | Yes | Larva | | 5 | CG |
| *Parametriocnemus* sp. | 1 | 0.16% | No | Pupa | | 5 | CG |
| *Tvetenia* sp. | 21 | 3.46% | Yes | Larva | | 5 | CG |
| **Sample Count** | **607** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD013

**RAI No.:** CB10LD013
**Client ID:** Wilkins 2
**Date Coll.:** 8/30/2010 **No. Jars:** 2
**Sta. Name:** Wilkins In bypass reach, near NE 8th & Northup Wy.
**STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 66 | 11.70% | Yes | Unknown | | 5 | PR |
| Nematoda | 5 | 0.89% | Yes | Unknown | | 5 | PA |
| Ostracoda | 4 | 0.71% | Yes | Unknown | | 8 | CG |
| Turbellaria | 162 | 28.72% | Yes | Unknown | | 4 | PR |
| Enchytraeidae | | | | | | | |
| *Enchytraeus* sp. | 25 | 4.43% | Yes | Unknown | | 4 | CG |
| *Fridericia* sp. | 6 | 1.06% | Yes | Unknown | | 11 | CG |
| *Mesenchytraeus* sp. | 7 | 1.24% | Yes | Unknown | | 4 | CG |
| Lumbriculidae | | | | | | | |
| Lumbriculidae | 2 | 0.35% | No | Immature | | 4 | CG |
| *Lumbriculus* sp. | 6 | 1.06% | Yes | Unknown | | 4 | CG |
| Planorbidae | | | | | | | |
| *Promenetus* sp. | 3 | 0.53% | Yes | Unknown | | 6 | SC |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 14 | 2.48% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 72 | 12.77% | Yes | Larva | | 1 | SH |
| Nemouridae | 5 | 0.89% | No | Larva | Early Instar | 2 | SH |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Lara* sp. | 1 | 0.18% | Yes | Larva | | 1 | SH |
| **Diptera** | | | | | | | |
| Dixidae | | | | | | | |
| *Dixa* sp. | 22 | 3.90% | Yes | Larva | | 1 | CG |
| Empididae | | | | | | | |
| *Neoplasta* sp. | 1 | 0.18% | Yes | Larva | | 5 | PR |
| Psychodidae | | | | | | | |
| *Pericoma* sp. | 1 | 0.18% | Yes | Larva | | 4 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 62 | 10.99% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 10 | 1.77% | No | Pupa | | 6 | CF |
| Thaumaleidae | | | | | | | |
| Thaumaleidae | 1 | 0.18% | Yes | Larva | | 11 | OM |
| Tipulidae | | | | | | | |
| *Tipula* sp. | 8 | 1.42% | Yes | Larva | | 4 | SH |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD013

**RAI No.:** CB10LD013
**Client ID:** Wilkins 2
**Date Coll.:** 8/30/2010 **No. Jars:** 2
**Sta. Name:** Wilkins In bypass reach, near NE 8th & Northup Wy.
**STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 3 | 0.53% | Yes | Larva | | 4 | SH |
| *Brundiniella eumorpha* | 1 | 0.18% | Yes | Larva | | 8 | PR |
| *Chaetocladius* sp. | 1 | 0.18% | Yes | Larva | | 6 | CG |
| *Corynoneura* sp. | 3 | 0.53% | Yes | Larva | | 7 | CG |
| *Diplocladius cultriger* | 2 | 0.35% | Yes | Larva | | 8 | CG |
| *Eukiefferiella* sp. | 14 | 2.48% | Yes | Larva | | 8 | CG |
| *Eukiefferiella* sp. | 1 | 0.18% | No | Pupa | | 8 | CG |
| *Micropsectra* sp. | 5 | 0.89% | Yes | Larva | | 4 | CG |
| *Microtendipes* sp. | 2 | 0.35% | Yes | Larva | | 6 | CF |
| Orthocladiinae | 1 | 0.18% | No | Pupa | Damaged | 6 | CG |
| *Parametriocnemus* sp. | 34 | 6.03% | Yes | Larva | | 5 | CG |
| *Phaenopsectra* sp. | 3 | 0.53% | Yes | Larva | | 7 | SC |
| *Polypedilum* sp. | 1 | 0.18% | Yes | Larva | | 6 | SH |
| *Tvetenia* sp. | 10 | 1.77% | Yes | Larva | | 5 | CG |
| **Sample Count** | **564** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD014

**RAI No.:** CB10LD014 **Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 1
**Client ID:** Lewis 1
**Date Coll.:** 8/20/2010 **No. Jars:** 2 **STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 1 | 0.14% | Yes | Unknown | | 5 | PR |
| Nematoda | 10 | 1.42% | Yes | Unknown | | 5 | PA |
| Crangonyctidae | | | | | | | |
| *Crangonyx* sp. | 6 | 0.85% | Yes | Unknown | | 6 | CG |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 4 | 0.57% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| *Nais* sp. | 2 | 0.28% | Yes | Unknown | | 8 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 56 | 7.97% | Yes | Larva | | 4 | CG |
| *Diphetor hageni* | 5 | 0.71% | Yes | Larva | | 5 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 34 | 4.84% | Yes | Larva | | 1 | SH |
| Perlodidae | | | | | | | |
| Perlodidae | 1 | 0.14% | Yes | Larva | Early Instar | 2 | PR |
| *Skwala* sp. | 1 | 0.14% | Yes | Larva | | 3 | PR |
| **Trichoptera** | | | | | | | |
| Glossosomatidae | | | | | | | |
| Glossosomatidae | 1 | 0.14% | Yes | Pupa | | 0 | SC |
| Hydropsychidae | | | | | | | |
| *Hydropsyche* sp. | 109 | 15.50% | Yes | Larva | | 5 | CF |
| Limnephilidae | | | | | | | |
| Limnephilidae | 1 | 0.14% | Yes | Pupa | | 3 | SH |
| Philopotamidae | | | | | | | |
| *Dolophilodes* sp. | 1 | 0.14% | Yes | Larva | | 0 | CF |
| Rhyacophilidae | | | | | | | |
| Rhyacophila Betteni Gr. | 2 | 0.28% | Yes | Larva | | 0 | PR |
| Rhyacophila Brunnea Gr. | 2 | 0.28% | Yes | Larva | | 2 | PR |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Heterlimnius* sp. | 2 | 0.28% | Yes | Larva | | 3 | CG |
| *Narpus concolor* | 6 | 0.85% | Yes | Larva | | 2 | CG |
| *Optioservus* sp. | 5 | 0.71% | Yes | Larva | | 5 | SC |
| **Diptera** | | | | | | | |
| Ceratopogonidae | | | | | | | |
| Forcipomyiinae | 1 | 0.14% | Yes | Larva | | 6 | PR |
| Empididae | | | | | | | |
| Empididae | 2 | 0.28% | Yes | Pupa | | 6 | PR |
| Psychodidae | | | | | | | |
| *Pericoma* sp. | 1 | 0.14% | Yes | Larva | | 4 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 5 | 0.71% | No | Pupa | | 6 | CF |
| *Simulium* sp. | 396 | 56.33% | Yes | Larva | | 6 | CF |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD014

**RAI No.:** CB10LD014 **Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 1
**Client ID:** Lewis 1
**Date Coll.:** 8/20/2010 **No. Jars:** 2 **STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 20 | 2.84% | Yes | Larva | | 4 | SH |
| *Corynoneura* sp. | 2 | 0.28% | Yes | Larva | | 7 | CG |
| *Eukiefferiella* sp. | 1 | 0.14% | Yes | Larva | | 8 | CG |
| *Eukiefferiella* sp. | 1 | 0.14% | No | Pupa | | 8 | CG |
| *Micropsectra* sp. | 1 | 0.14% | No | Pupa | | 4 | CG |
| *Micropsectra* sp. | 19 | 2.70% | Yes | Larva | | 4 | CG |
| *Parametriocnemus* sp. | 1 | 0.14% | Yes | Larva | | 5 | CG |
| *Polypedilum* sp. | 1 | 0.14% | No | Pupa | | 6 | SH |
| *Polypedilum* sp. | 1 | 0.14% | Yes | Larva | | 6 | SH |
| *Rheocricotopus* sp. | 1 | 0.14% | Yes | Pupa | | 4 | CG |
| *Tvetenia* sp. | 1 | 0.14% | Yes | Larva | | 5 | CG |
| **Sample Count** | **703** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD015

**RAI No.:** CB10LD015 **Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 2
**Client ID:** Lewis 2
**Date Coll.:** 8/20/2010 **No. Jars:** 1 **STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 2 | 0.32% | Yes | Unknown | | 5 | PR |
| Nematoda | 11 | 1.77% | Yes | Unknown | | 5 | PA |
| Turbellaria | 7 | 1.13% | Yes | Unknown | | 4 | PR |
| Enchytraeidae | | | | | | | |
| *Fridericia* sp. | 1 | 0.16% | Yes | Unknown | | 11 | CG |
| Lumbriculidae | | | | | | | |
| *Eclipidrilus* sp. | 3 | 0.48% | Yes | Unknown | | 4 | CG |
| *Lumbriculus* sp. | 8 | 1.29% | Yes | Unknown | | 4 | CG |
| Naididae | | | | | | | |
| *Nais* sp. | 1 | 0.16% | Yes | Unknown | | 8 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 38 | 6.13% | Yes | Larva | | 4 | CG |
| *Diphetor hageni* | 5 | 0.81% | Yes | Larva | | 5 | CG |
| Heptageniidae | | | | | | | |
| *Heptagenia* sp. | 2 | 0.32% | Yes | Larva | | 4 | SC |
| *Stenacron* sp. | 1 | 0.16% | Yes | Larva | | 7 | SC |
| **Plecoptera** | | | | | | | |
| Leuctridae | | | | | | | |
| Leuctridae | 2 | 0.32% | Yes | Larva | Early Instar | 0 | SH |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 14 | 2.26% | Yes | Larva | | 1 | SH |
| Perlodidae | | | | | | | |
| *Skwala* sp. | 3 | 0.48% | Yes | Larva | | 3 | PR |
| Pteronarcyidae | | | | | | | |
| *Pteronarcys* sp. | 1 | 0.16% | Yes | Larva | | 2 | SH |
| **Trichoptera** | | | | | | | |
| Hydropsychidae | | | | | | | |
| *Hydropsyche* sp. | 166 | 26.77% | Yes | Larva | | 5 | CF |
| Lepidostomatidae | | | | | | | |
| *Lepidostoma* sp. | 2 | 0.32% | Yes | Larva | | 1 | SH |
| Rhyacophilidae | | | | | | | |
| Rhyacophila Betteni Gr. | 3 | 0.48% | Yes | Larva | | 0 | PR |
| Rhyacophila Brunnea Gr. | 7 | 1.13% | Yes | Larva | | 2 | PR |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Heterlimnius* sp. | 2 | 0.32% | Yes | Larva | | 3 | CG |
| *Narpus concolor* | 9 | 1.45% | Yes | Larva | | 2 | CG |
| *Optioservus* sp. | 13 | 2.10% | No | Larva | | 5 | SC |
| *Optioservus* sp. | 1 | 0.16% | Yes | Adult | | 5 | SC |
| *Zaitzevia* sp. | 2 | 0.32% | No | Larva | | 5 | CG |
| *Zaitzevia* sp. | 9 | 1.45% | Yes | Adult | | 5 | CG |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD015

**RAI No.:** CB10LD015 **Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 2
**Client ID:** Lewis 2
**Date Coll.:** 8/20/2010 **No. Jars:** 1 **STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Diptera** | | | | | | | |
| Dixidae | | | | | | | |
| *Dixa* sp. | 3 | 0.48% | Yes | Larva | | 1 | CG |
| Empididae | | | | | | | |
| *Chelifera* sp. | 1 | 0.16% | Yes | Larva | | 5 | PR |
| Psychodidae | | | | | | | |
| *Pericoma* sp. | 1 | 0.16% | Yes | Larva | | 4 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 5 | 0.81% | No | Pupa | | 6 | CF |
| *Simulium* sp. | 247 | 39.84% | Yes | Larva | | 6 | CF |
| Thaumaleidae | | | | | | | |
| Thaumaleidae | 2 | 0.32% | Yes | Larva | | 11 | OM |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Boreochlus* sp. | 1 | 0.16% | Yes | Larva | | 1 | CG |
| *Brillia* sp. | 2 | 0.32% | Yes | Larva | | 4 | SH |
| *Corynoneura* sp. | 1 | 0.16% | Yes | Larva | | 7 | CG |
| *Eukiefferiella* sp. | 3 | 0.48% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 30 | 4.84% | Yes | Larva | | 4 | CG |
| *Parametriocnemus* sp. | 2 | 0.32% | Yes | Larva | | 5 | CG |
| *Polypedilum* sp. | 6 | 0.97% | Yes | Larva | | 6 | SH |
| *Reomyia* sp. | 1 | 0.16% | Yes | Larva | | 11 | PR |
| *Smittia* sp. | 1 | 0.16% | Yes | Larva | | 6 | CG |
| *Symposiocladius* sp. | 1 | 0.16% | Yes | Larva | | 5 | SH |
| **Sample Count** | **620** | | | | | | |

# Taxa Listing

**Project ID:** CB10LD
**RAI No.:** CB10LD016

**RAI No.:** CB10LD016 **Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 3
**Client ID:** Lewis 3
**Date Coll.:** 8/20/2010 **No. Jars:** 2 **STORET ID:** 700 subsample

| Taxonomic Name | Count | PRA | Unique | Stage | Qualifier | BI | Function |
|---|---|---|---|---|---|---|---|
| **Non-Insect** | | | | | | | |
| Acari | 8 | 1.16% | Yes | Unknown | | 5 | PR |
| Nematoda | 6 | 0.87% | Yes | Unknown | | 5 | PA |
| Lumbriculidae | | | | | | | |
| *Lumbriculus* sp. | 1 | 0.14% | Yes | Unknown | | 4 | CG |
| **Ephemeroptera** | | | | | | | |
| Baetidae | | | | | | | |
| *Baetis tricaudatus* | 145 | 21.01% | Yes | Larva | | 4 | CG |
| **Plecoptera** | | | | | | | |
| Nemouridae | | | | | | | |
| *Malenka* sp. | 189 | 27.39% | Yes | Larva | | 1 | SH |
| Perlodidae | | | | | | | |
| *Skwala* sp. | 7 | 1.01% | Yes | Larva | | 3 | PR |
| **Trichoptera** | | | | | | | |
| Hydropsychidae | | | | | | | |
| *Hydropsyche* sp. | 58 | 8.41% | Yes | Larva | | 5 | CF |
| Hydropsychidae | 36 | 5.22% | No | Larva | Early Instar | 4 | CF |
| Philopotamidae | | | | | | | |
| *Dolophilodes* sp. | 2 | 0.29% | Yes | Larva | | 0 | CF |
| Rhyacophilidae | | | | | | | |
| Rhyacophila Betteni Gr. | 1 | 0.14% | Yes | Larva | | 0 | PR |
| Rhyacophila Brunnea Gr. | 2 | 0.29% | Yes | Larva | | 2 | PR |
| **Coleoptera** | | | | | | | |
| Elmidae | | | | | | | |
| *Narpus concolor* | 1 | 0.14% | Yes | Larva | | 2 | CG |
| *Optioservus* sp. | 1 | 0.14% | Yes | Adult | | 5 | SC |
| *Optioservus* sp. | 2 | 0.29% | No | Larva | | 5 | SC |
| *Zaitzevia* sp. | 2 | 0.29% | Yes | Adult | | 5 | CG |
| **Diptera** | | | | | | | |
| Dixidae | | | | | | | |
| *Dixa* sp. | 42 | 6.09% | Yes | Larva | | 1 | CG |
| Simuliidae | | | | | | | |
| *Simulium* sp. | 158 | 22.90% | Yes | Larva | | 6 | CF |
| *Simulium* sp. | 6 | 0.87% | No | Pupa | | 6 | CF |
| Thaumaleidae | | | | | | | |
| Thaumaleidae | 2 | 0.29% | Yes | Larva | | 11 | OM |
| **Chironomidae** | | | | | | | |
| Chironomidae | | | | | | | |
| *Brillia* sp. | 4 | 0.58% | Yes | Larva | | 4 | SH |
| *Eukiefferiella* sp. | 1 | 0.14% | Yes | Larva | | 8 | CG |
| *Micropsectra* sp. | 11 | 1.59% | Yes | Larva | | 4 | CG |
| *Parametriocnemus* sp. | 2 | 0.29% | Yes | Larva | | 5 | CG |
| *Polypedilum* sp. | 3 | 0.43% | Yes | Larva | | 6 | SH |
| **Sample Count** | **690** | | | | | | |

# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD001
**Sta. Name:** Goff Creek just upstream of confluence w/ West Trib Rep 1
**Client ID:** Goff 1
**STORET ID:** 500 subsample
**Coll. Date:** 8/10/2010

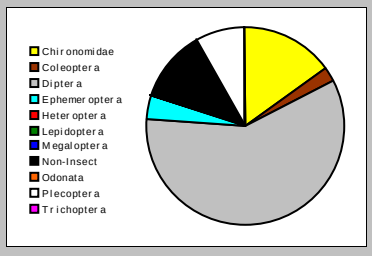
## Abundance Measures

**Sample Count:** 351
**Sample Abundance:** 351.00 100.00% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** GoffMouth

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 6 | 42 | 11.97% |
| Odonata | | | |
| Ephemeroptera | 1 | 15 | 4.27% |
| Plecoptera | 1 | 28 | 7.98% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | 2 | 7 | 1.99% |
| Diptera | 4 | 205 | 58.40% |
| Chironomidae | 6 | 54 | 15.38% |

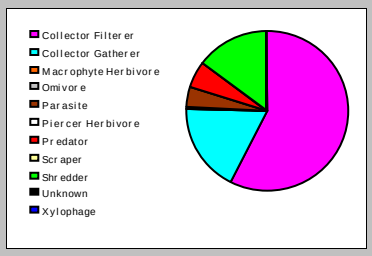



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Simulium | 201 | 57.26% |
| Malenka | 28 | 7.98% |
| Brillia | 24 | 6.84% |
| Tvetenia | 17 | 4.84% |
| Baetis | 15 | 4.27% |
| Nematoda | 14 | 3.99% |
| Acari | 12 | 3.42% |
| Hyalella | 9 | 2.56% |
| Narpus concolor | 6 | 1.71% |
| Eukiefferiella | 5 | 1.42% |
| Turbellaria | 3 | 0.85% |
| Pagastia | 3 | 0.85% |
| Parametriocnemus | 2 | 0.57% |
| Orthocladiinae | 2 | 0.57% |
| Fridericia | 2 | 0.57% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 4 | 18 | 5.13% |
| Parasite | 1 | 14 | 3.99% |
| Collector Gatherer | 10 | 64 | 18.23% |
| Collector Filterer | 1 | 201 | 57.26% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 3 | 53 | 15.10% |
| Omivore | 1 | 1 | 0.28% |
| Unknown | | | |

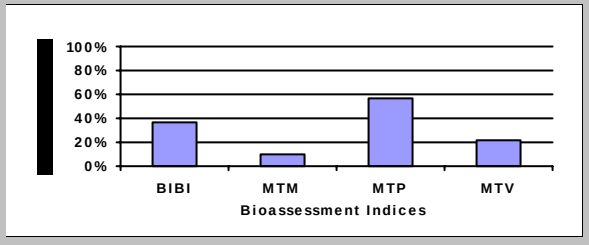



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 20 | 3 | 2 | | 1 |
| Non-Insect Percent | 11.97% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 2 | | 0 | | 0 |
| EPT Percent | 12.25% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 1.14% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 57.27% | | 1 | | 0 |
| Dominant Taxa (2) Percent | 65.24% | | | | |
| Dominant Taxa (3) Percent | 72.08% | 3 | | | |
| Dominant Taxa (10) Percent | 94.30% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.723 | | | | |
| Shannon H (log2) | 2.485 | | 2 | | |
| Margalef D | 3.258 | | | | |
| Simpson D | 0.346 | | | | |
| Evenness | 0.081 | | | | |
| *Function* | | | | | |
| Predator Richness | 4 | | 2 | | |
| Predator Percent | 5.13% | 1 | | | |
| Filterer Richness | 1 | | | | |
| Filterer Percent | 57.27% | | | 0 | |
| Collector Percent | 75.50% | | 2 | | 1 |
| Scraper+Shredder Percent | 15.10% | | 2 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 4 | | | | |
| Burrower Percent | 7.69% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 4.56% | | | | |
| Clinger Richness | 2 | 1 | | | |
| Clinger Percent | 58.97% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | | | | | |
| Hemoglobin Bearer Percent | | | | | |
| Air Breather Richness | 2 | | | | |
| Air Breather Percent | 0.57% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 6 | | | | |
| Semivoltine Richness | 2 | 1 | | | |
| Multivoltine Percent | 27.92% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 1 | | | | |
| Sediment Tolerant Percent | 0.57% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 4.459 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.00% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 5.203 | | 2 | | 0 |
| Intolerant Percent | 10.83% | | | | |
| Supertolerant Percent | 3.99% | | | | |
| CTQa | 93.688 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 18 | 36.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 17 | 56.67% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 4 | 22.22% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 2 | 9.52% | Severe |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD002
**Sta. Name:** Goff Creek just upstream of confluence w/ West Trib Rep 2
**Client ID:** Goff 2
**STORET ID:** 500 subsample
**Coll. Date:** 8/10/2010

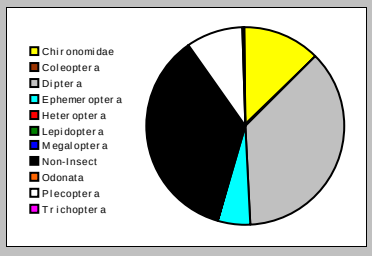
## Abundance Measures

**Sample Count:** 527
**Sample Abundance:** 1,054.00 50.00% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** GoffMouth

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 7 | 191 | 36.24% |
| Odonata | | | |
| Ephemeroptera | 1 | 26 | 4.93% |
| Plecoptera | 2 | 50 | 9.49% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 1 | 1 | 0.19% |
| Lepidoptera | | | |
| Coleoptera | 1 | 1 | 0.19% |
| Diptera | 2 | 191 | 36.24% |
| Chironomidae | 10 | 67 | 12.71% |

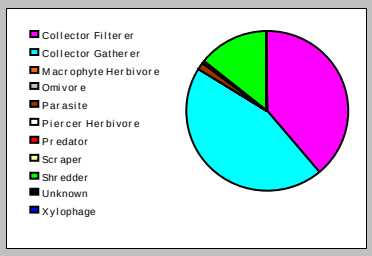



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Simulium | 190 | 36.05% |
| Lumbriculus | 113 | 21.44% |
| Hyalella | 52 | 9.87% |
| Malenka | 37 | 7.02% |
| Tvetenia | 27 | 5.12% |
| Baetis tricaudatus | 26 | 4.93% |
| Brillia | 23 | 4.36% |
| Zapada cinctipes | 13 | 2.47% |
| Sphaeriidae | 11 | 2.09% |
| Nematoda | 6 | 1.14% |
| Eukiefferiella | 5 | 0.95% |
| Turbellaria | 4 | 0.76% |
| Mesenchytraeus | 4 | 0.76% |
| Micropsectra | 2 | 0.38% |
| Corynoneura | 2 | 0.38% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 1 | 4 | 0.76% |
| Parasite | 1 | 6 | 1.14% |
| Collector Gatherer | 14 | 237 | 44.97% |
| Collector Filterer | 3 | 203 | 38.52% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 4 | 75 | 14.23% |
| Omivore | 1 | 2 | 0.38% |
| Unknown | | | |

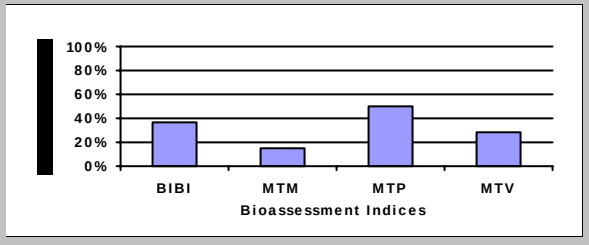



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 24 | 3 | 2 | | 2 |
| Non-Insect Percent | 36.24% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 2 | 1 | | 2 | |
| T Richness | 1 | 1 | | 0 | |
| EPT Richness | 4 | | 1 | | 0 |
| EPT Percent | 14.61% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 22.39% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 1.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 36.05% | | 2 | | 1 |
| Dominant Taxa (2) Percent | 57.50% | | | | |
| Dominant Taxa (3) Percent | 67.36% | 3 | | | |
| Dominant Taxa (10) Percent | 94.50% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.057 | | | | |
| Shannon H (log2) | 2.967 | | 2 | | |
| Margalef D | 3.674 | | | | |
| Simpson D | 0.199 | | | | |
| Evenness | 0.084 | | | | |
| *Function* | | | | | |
| Predator Richness | 1 | | 0 | | |
| Predator Percent | 0.76% | 1 | | | |
| Filterer Richness | 3 | | | | |
| Filterer Percent | 38.52% | | | 0 | |
| Collector Percent | 83.49% | | 1 | | 0 |
| Scraper+Shredder Percent | 14.23% | | 1 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 3 | | | | |
| Burrower Percent | 4.93% | | | | |
| Swimmer Richness | 1 | | | | |
| Swimmer Percent | 4.93% | | | | |
| Clinger Richness | 4 | 1 | | | |
| Clinger Percent | 36.81% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.38% | | | | |
| Air Breather Richness | 1 | | | | |
| Air Breather Percent | 0.19% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 8 | | | | |
| Semivoltine Richness | 1 | 1 | | | |
| Multivoltine Percent | 19.54% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 0 | | | | |
| Sediment Tolerant Percent | 0.00% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 4.124 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.19% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 5.101 | | 2 | | 0 |
| Intolerant Percent | 7.21% | | | | |
| Supertolerant Percent | 13.09% | | | | |
| CTQa | 97.474 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 18 | 36.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 15 | 50.00% | Moderate |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 5 | 27.78% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 3 | 14.29% | Severe |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD003
**Sta. Name:** Goff Creek just upstream of confluence w/ West Trib Rep 3
**Client ID:** Goff 3
**STORET ID:** 500 subsample
**Coll. Date:** 8/10/2010

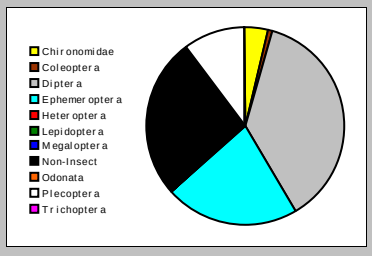
## Abundance Measures

**Sample Count:** 500
**Sample Abundance:** 1,071.43 46.67% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** GoffMouth

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 6 | 132 | 26.40% |
| Odonata | | | |
| Ephemeroptera | 1 | 109 | 21.80% |
| Plecoptera | 2 | 52 | 10.40% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | 1 | 3 | 0.60% |
| Diptera | 2 | 185 | 37.00% |
| Chironomidae | 7 | 19 | 3.80% |

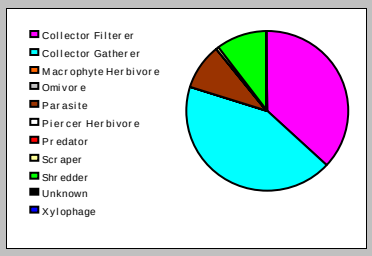



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Simulium | 184 | 36.80% |
| Baetis tricaudatus | 109 | 21.80% |
| Nematoda | 47 | 9.40% |
| Lumbriculus | 39 | 7.80% |
| Hyalella | 37 | 7.40% |
| Malenka | 34 | 6.80% |
| Zapada cinctipes | 18 | 3.60% |
| Eukiefferiella | 5 | 1.00% |
| Pagastia | 4 | 0.80% |
| Micropsectra | 4 | 0.80% |
| Narpus concolor | 3 | 0.60% |
| Naididae (Tubificinae) - without c | 3 | 0.60% |
| Mesenchytraeus | 3 | 0.60% |
| Fridericia | 3 | 0.60% |
| Phaenopsectra | 2 | 0.40% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | | | |
| Parasite | 1 | 47 | 9.40% |
| Collector Gatherer | 13 | 214 | 42.80% |
| Collector Filterer | 1 | 184 | 36.80% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 1 | 2 | 0.40% |
| Shredder | 2 | 52 | 10.40% |
| Omivore | 1 | 1 | 0.20% |
| Unknown | | | |

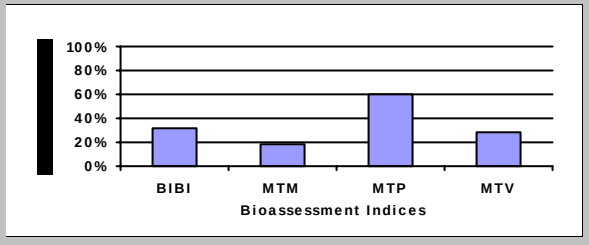



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 19 | 1 | 2 | | 1 |
| Non-Insect Percent | 26.40% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 2 | 1 | | 2 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 3 | | 1 | | 0 |
| EPT Percent | 32.20% | | 2 | | 0 |
| Oligochaeta+Hirudinea Percent | 9.60% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 36.80% | | 2 | | 1 |
| Dominant Taxa (2) Percent | 58.60% | | | | |
| Dominant Taxa (3) Percent | 68.00% | 3 | | | |
| Dominant Taxa (10) Percent | 96.20% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.946 | | | | |
| Shannon H (log2) | 2.807 | | 2 | | |
| Margalef D | 2.897 | | | | |
| Simpson D | 0.207 | | | | |
| Evenness | 0.094 | | | | |
| *Function* | | | | | |
| Predator Richness | 0 | | 0 | | |
| Predator Percent | 0.00% | 1 | | | |
| Filterer Richness | 1 | | | | |
| Filterer Percent | 36.80% | | | 0 | |
| Collector Percent | 79.60% | | 2 | | 1 |
| Scraper+Shredder Percent | 10.80% | | 1 | | 0 |
| Scraper/Filterer | 0.011 | | | | |
| Scraper/Scraper+Filterer | 0.011 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 1 | | | | |
| Burrower Percent | 0.20% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 22.00% | | | | |
| Clinger Richness | 3 | 1 | | | |
| Clinger Percent | 37.80% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.40% | | | | |
| Air Breather Richness | 0 | | | | |
| Air Breather Percent | 0.00% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 6 | | | | |
| Semivoltine Richness | 1 | 1 | | | |
| Multivoltine Percent | 35.00% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 0 | | | | |
| Sediment Tolerant Percent | 0.00% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 4.460 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.00% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 4.917 | | 3 | | 1 |
| Intolerant Percent | 8.40% | | | | |
| Supertolerant Percent | 8.40% | | | | |
| CTQa | 93.714 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 16 | 32.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 18 | 60.00% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 5 | 27.78% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 4 | 19.05% | Severe |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD004
**Sta. Name:** Lower Phantom, just upstream of W Lk Samm in Weowna Park
**Client ID:** Phantom 1
**STORET ID:** 500 subsample
**Coll. Date:** 8/30/2010

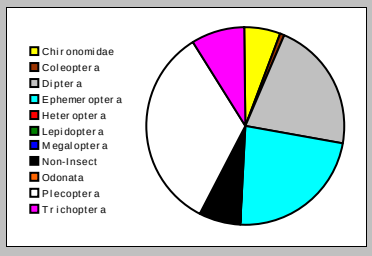
## *Abundance Measures*

**Sample Count:** 535
**Sample Abundance:** 642.00 83.33% of sample used

**Coll. Procedure:** 8 surbers
**Sample Notes:** PhanWeowna

## *Taxonomic Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 7 | 36 | 6.73% |
| Odonata | | | |
| Ephemeroptera | 1 | 123 | 22.99% |
| Plecoptera | 4 | 181 | 33.83% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 2 | 47 | 8.79% |
| Lepidoptera | | | |
| Coleoptera | 2 | 5 | 0.93% |
| Diptera | 6 | 112 | 20.93% |
| Chironomidae | 8 | 31 | 5.79% |

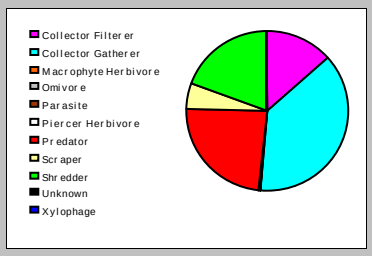



## *Dominant Taxa*

| Category | A | PRA |
|---|---|---|
| Baetis tricaudatus | 123 | 22.99% |
| Sweltsa | 81 | 15.14% |
| Malenka | 72 | 13.46% |
| Simulium | 71 | 13.27% |
| Glossosoma | 29 | 5.42% |
| Dixa | 26 | 4.86% |
| Zapada cinctipes | 18 | 3.36% |
| Parametriocnemus | 18 | 3.36% |
| Parapsyche almota | 16 | 2.99% |
| Turbellaria | 12 | 2.24% |
| Lumbriculus | 8 | 1.50% |
| Lumbriculidae | 8 | 1.50% |
| Leuctridae | 8 | 1.50% |
| Dicranota | 8 | 1.50% |
| Tvetenia | 5 | 0.93% |

## *Functional Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 7 | 125 | 23.36% |
| Parasite | 1 | 2 | 0.37% |
| Collector Gatherer | 14 | 202 | 37.76% |
| Collector Filterer | 1 | 73 | 13.64% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 1 | 29 | 5.42% |
| Shredder | 6 | 104 | 19.44% |
| Omivore | | | |
| Unknown | | | |

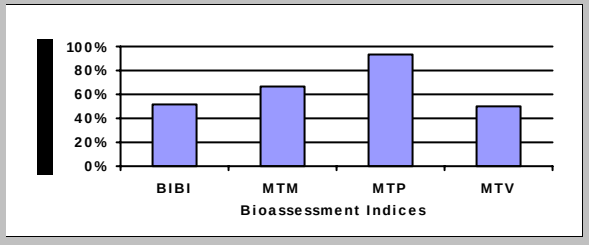



## *Metric Values and Scores*

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 30 | 3 | 3 | | 3 |
| Non-Insect Percent | 6.73% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 4 | 3 | | 3 | |
| T Richness | 2 | 1 | | 1 | |
| EPT Richness | 7 | | 2 | | 0 |
| EPT Percent | 65.61% | | 3 | | 2 |
| Oligochaeta+Hirudinea Percent | 4.11% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.383 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 22.99% | | 3 | | 3 |
| Dominant Taxa (2) Percent | 38.13% | | | | |
| Dominant Taxa (3) Percent | 51.59% | 3 | | | |
| Dominant Taxa (10) Percent | 87.10% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.437 | | | | |
| Shannon H (log2) | 3.516 | | 3 | | |
| Margalef D | 4.644 | | | | |
| Simpson D | 0.126 | | | | |
| Evenness | 0.069 | | | | |
| *Function* | | | | | |
| Predator Richness | 7 | | 3 | | |
| Predator Percent | 23.36% | 5 | | | |
| Filterer Richness | 1 | | | | |
| Filterer Percent | 13.64% | | | 1 | |
| Collector Percent | 51.40% | | 3 | | 3 |
| Scraper+Shredder Percent | 24.86% | | 2 | | 0 |
| Scraper/Filterer | 0.397 | | | | |
| Scraper/Scraper+Filterer | 0.284 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 4 | | | | |
| Burrower Percent | 2.43% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 27.85% | | | | |
| Clinger Richness | 5 | 1 | | | |
| Clinger Percent | 22.99% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 1 | | | | |
| Cold Stenotherm Percent | 1.50% | | | | |
| Hemoglobin Bearer Richness | | | | | |
| Hemoglobin Bearer Percent | | | | | |
| Air Breather Richness | 2 | | | | |
| Air Breather Percent | 1.87% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 13 | | | | |
| Semivoltine Richness | 3 | 3 | | | |
| Multivoltine Percent | 31.40% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 2 | | | | |
| Sediment Tolerant Percent | 3.36% | | | | |
| Sediment Sensitive Richness | 1 | | | | |
| Sediment Sensitive Percent | 5.42% | | | | |
| Metals Tolerance Index | 3.560 | | | | |
| Pollution Sensitive Richness | 1 | 1 | | 1 | |
| Pollution Tolerant Percent | 0.19% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 2.801 | | 3 | | 3 |
| Intolerant Percent | 41.68% | | | | |
| Supertolerant Percent | 0.56% | | | | |
| CTQa | 78.840 | | | | |

## *Bioassessment Indices*

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 26 | 52.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 28 | 93.33% | None |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 9 | 50.00% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 14 | 66.67% | Slight |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD005
**Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 1
**Client ID:** W. Trib Kelsey 1
**STORET ID:** 500 subsample
**Coll. Date:** 8/24/2010

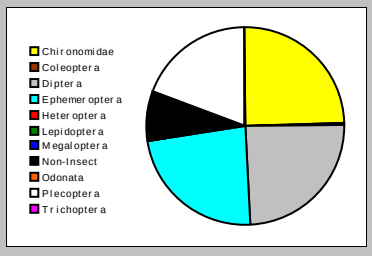
## Abundance Measures

**Sample Count:** 522
**Sample Abundance:** 1,957.50 26.67% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** WTribFarm

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 7 | 43 | 8.24% |
| Odonata | | | |
| Ephemeroptera | 1 | 123 | 23.56% |
| Plecoptera | 1 | 101 | 19.35% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | 1 | 1 | 0.19% |
| Diptera | 4 | 125 | 23.95% |
| Chironomidae | 9 | 129 | 24.71% |

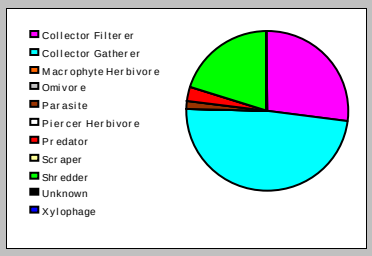



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Baetis tricaudatus | 123 | 23.56% |
| Simulium | 111 | 21.26% |
| Malenka | 91 | 17.43% |
| Micropsectra | 42 | 8.05% |
| Rheotanytarsus | 29 | 5.56% |
| Crangonyx | 28 | 5.36% |
| Tvetenia | 19 | 3.64% |
| Eukiefferiella | 14 | 2.68% |
| Pagastia | 13 | 2.49% |
| Nemouridae | 10 | 1.92% |
| Dicranota | 9 | 1.72% |
| Nematoda | 7 | 1.34% |
| Synorthocladius | 4 | 0.77% |
| Parametriocnemus | 4 | 0.77% |
| Acari | 4 | 0.77% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 4 | 16 | 3.07% |
| Parasite | 1 | 7 | 1.34% |
| Collector Gatherer | 13 | 254 | 48.66% |
| Collector Filterer | 2 | 141 | 27.01% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 3 | 104 | 19.92% |
| Omivore | | | |
| Unknown | | | |

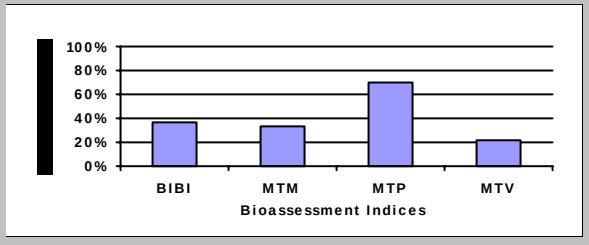



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 23 | 3 | 2 | | 1 |
| Non-Insect Percent | 8.24% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 2 | | 0 | | 0 |
| EPT Percent | 42.91% | | 2 | | 1 |
| Oligochaeta+Hirudinea Percent | 0.57% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 23.56% | | 3 | | 3 |
| Dominant Taxa (2) Percent | 44.83% | | | | |
| Dominant Taxa (3) Percent | 62.26% | 3 | | | |
| Dominant Taxa (10) Percent | 91.95% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.215 | | | | |
| Shannon H (log2) | 3.196 | | 3 | | |
| Margalef D | 3.550 | | | | |
| Simpson D | 0.151 | | | | |
| Evenness | 0.082 | | | | |
| *Function* | | | | | |
| Predator Richness | 4 | | 2 | | |
| Predator Percent | 3.07% | 1 | | | |
| Filterer Richness | 2 | | | | |
| Filterer Percent | 27.01% | | | 0 | |
| Collector Percent | 75.67% | | 2 | | 1 |
| Scraper+Shredder Percent | 19.92% | | 2 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 3 | | | | |
| Burrower Percent | 2.30% | | | | |
| Swimmer Richness | 1 | | | | |
| Swimmer Percent | 23.56% | | | | |
| Clinger Richness | 5 | 1 | | | |
| Clinger Percent | 27.78% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | | | | | |
| Hemoglobin Bearer Percent | | | | | |
| Air Breather Richness | 2 | | | | |
| Air Breather Percent | 2.30% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 6 | | | | |
| Semivoltine Richness | 1 | 1 | | | |
| Multivoltine Percent | 50.57% | | 2 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 2 | | | | |
| Sediment Tolerant Percent | 2.30% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 3.725 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.00% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 4.156 | | 3 | | 1 |
| Intolerant Percent | 22.80% | | | | |
| Supertolerant Percent | 2.68% | | | | |
| CTQa | 91.944 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 18 | 36.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 21 | 70.00% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 4 | 22.22% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 7 | 33.33% | Moderate |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD006
**Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 2
**Client ID:** W. Trib Kelsey 2
**STORET ID:** 500 subsample
**Coll. Date:** 8/24/2010

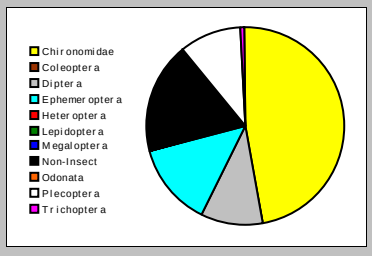
## *Abundance Measures*

**Sample Count:** 520
**Sample Abundance:** 2,228.57 23.33% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** WTribFarm

## *Taxonomic Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 8 | 94 | 18.08% |
| Odonata | | | |
| Ephemeroptera | 1 | 73 | 14.04% |
| Plecoptera | 1 | 54 | 10.38% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 3 | 3 | 0.58% |
| Lepidoptera | | | |
| Coleoptera | | | |
| Diptera | 4 | 50 | 9.62% |
| Chironomidae | 12 | 246 | 47.31% |

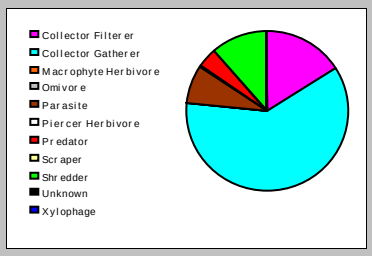



## *Dominant Taxa*

| Category | A | PRA |
|---|---|---|
| Micropsectra | 136 | 26.15% |
| Baetis tricaudatus | 73 | 14.04% |
| Malenka | 54 | 10.38% |
| Simulium | 44 | 8.46% |
| Nematoda | 41 | 7.88% |
| Rheotanytarsus | 30 | 5.77% |
| Crangonyx | 30 | 5.77% |
| Tvetenia | 26 | 5.00% |
| Pagastia | 19 | 3.65% |
| Eukiefferiella | 13 | 2.50% |
| Acari | 9 | 1.73% |
| Turbellaria | 8 | 1.54% |
| Tanytarsini | 4 | 0.77% |
| Cricotopus | 4 | 0.77% |
| Antocha | 4 | 0.77% |

## *Functional Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 5 | 21 | 4.04% |
| Parasite | 1 | 41 | 7.88% |
| Collector Gatherer | 14 | 313 | 60.19% |
| Collector Filterer | 5 | 85 | 16.35% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | 1 | 1 | 0.19% |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 3 | 59 | 11.35% |
| Omivore | | | |
| Unknown | | | |

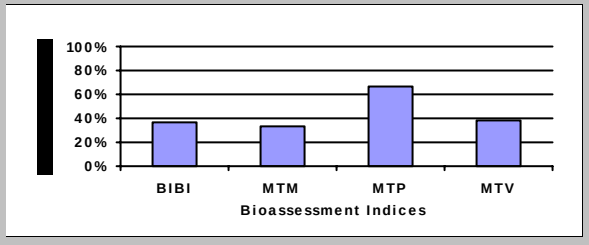



## *Metric Values and Scores*

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 29 | 3 | 3 | | 3 |
| Non-Insect Percent | 18.08% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 3 | 1 | | 2 | |
| EPT Richness | 5 | | 1 | | 0 |
| EPT Percent | 25.00% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 0.38% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.333 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 26.15% | | 3 | | 2 |
| Dominant Taxa (2) Percent | 40.19% | | | | |
| Dominant Taxa (3) Percent | 50.58% | 3 | | | |
| Dominant Taxa (10) Percent | 89.62% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.454 | | | | |
| Shannon H (log2) | 3.541 | | 3 | | |
| Margalef D | 4.493 | | | | |
| Simpson D | 0.125 | | | | |
| Evenness | 0.068 | | | | |
| *Function* | | | | | |
| Predator Richness | 5 | | 2 | | |
| Predator Percent | 4.04% | 1 | | | |
| Filterer Richness | 5 | | | | |
| Filterer Percent | 16.35% | | | 1 | |
| Collector Percent | 76.54% | | 2 | | 1 |
| Scraper+Shredder Percent | 11.35% | | 1 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 2 | | | | |
| Burrower Percent | 0.38% | | | | |
| Swimmer Richness | 1 | | | | |
| Swimmer Percent | 14.04% | | | | |
| Clinger Richness | 7 | 1 | | | |
| Clinger Percent | 16.73% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.58% | | | | |
| Air Breather Richness | 3 | | | | |
| Air Breather Percent | 1.15% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 10 | | | | |
| Semivoltine Richness | 0 | 1 | | | |
| Multivoltine Percent | 72.88% | | 1 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 2 | | | | |
| Sediment Tolerant Percent | 0.96% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 3.333 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.19% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 4.327 | | 3 | | 1 |
| Intolerant Percent | 14.42% | | | | |
| Supertolerant Percent | 3.46% | | | | |
| CTQa | 91.154 | | | | |

## *Bioassessment Indices*

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 18 | 36.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 20 | 66.67% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 7 | 38.89% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 7 | 33.33% | Moderate |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD007
**Sta. Name:** West Trib in Kelsey Farm, restored reach Rep 3
**Client ID:** W. Trib Kelsey 3
**STORET ID:** 500 subsample
**Coll. Date:** 8/24/2010

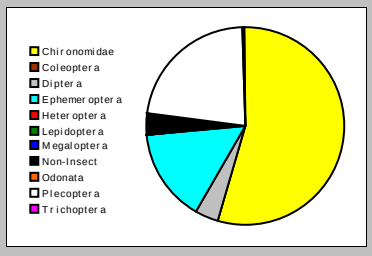
## Abundance Measures

**Sample Count:** 531
**Sample Abundance:** 2,655.00 20.00% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** WTribFarm

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 6 | 19 | 3.58% |
| Odonata | | | |
| Ephemeroptera | 1 | 81 | 15.25% |
| Plecoptera | 1 | 122 | 22.98% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 1 | 1 | 0.19% |
| Lepidoptera | | | |
| Coleoptera | | | |
| Diptera | 2 | 21 | 3.95% |
| Chironomidae | 10 | 287 | 54.05% |

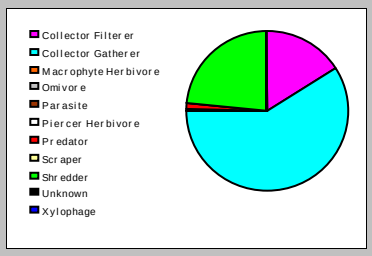



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Micropsectra | 147 | 27.68% |
| Malenka | 122 | 22.98% |
| Baetis tricaudatus | 81 | 15.25% |
| Rheotanytarsus | 65 | 12.24% |
| Tvetenia | 28 | 5.27% |
| Eukiefferiella | 20 | 3.77% |
| Simulium | 17 | 3.20% |
| Pagastia | 13 | 2.45% |
| Crangonyx | 11 | 2.07% |
| Orthocladius | 4 | 0.75% |
| Antocha | 4 | 0.75% |
| Acari | 3 | 0.56% |
| Thienemannimyia Gr. | 2 | 0.38% |
| Tanytarsini | 2 | 0.38% |
| Brillia | 2 | 0.38% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 4 | 7 | 1.32% |
| Parasite | 1 | 2 | 0.38% |
| Collector Gatherer | 11 | 313 | 58.95% |
| Collector Filterer | 3 | 85 | 16.01% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 2 | 124 | 23.35% |
| Omivore | | | |
| Unknown | | | |

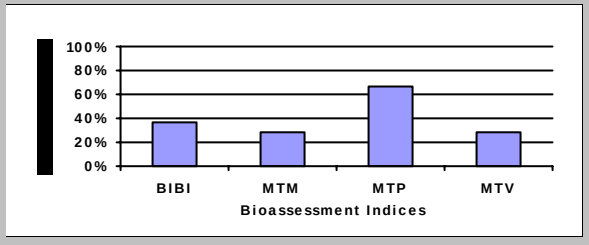



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 21 | 3 | 2 | | 1 |
| Non-Insect Percent | 3.58% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 1 | 1 | | 0 | |
| EPT Richness | 3 | | 1 | | 0 |
| EPT Percent | 38.42% | | 2 | | 0 |
| Oligochaeta+Hirudinea Percent | 0.38% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 1.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 27.68% | | 3 | | 2 |
| Dominant Taxa (2) Percent | 50.66% | | | | |
| Dominant Taxa (3) Percent | 65.91% | 3 | | | |
| Dominant Taxa (10) Percent | 95.67% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.025 | | | | |
| Shannon H (log2) | 2.922 | | 2 | | |
| Margalef D | 3.199 | | | | |
| Simpson D | 0.179 | | | | |
| Evenness | 0.091 | | | | |
| *Function* | | | | | |
| Predator Richness | 4 | | 2 | | |
| Predator Percent | 1.32% | 1 | | | |
| Filterer Richness | 3 | | | | |
| Filterer Percent | 16.01% | | | 1 | |
| Collector Percent | 74.95% | | 2 | | 1 |
| Scraper+Shredder Percent | 23.35% | | 2 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 1 | | | | |
| Burrower Percent | 0.38% | | | | |
| Swimmer Richness | 1 | | | | |
| Swimmer Percent | 15.25% | | | | |
| Clinger Richness | 4 | 1 | | | |
| Clinger Percent | 16.38% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | | | | | |
| Hemoglobin Bearer Percent | | | | | |
| Air Breather Richness | 1 | | | | |
| Air Breather Percent | 0.75% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 5 | | | | |
| Semivoltine Richness | 0 | 1 | | | |
| Multivoltine Percent | 70.43% | | 1 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 1 | | | | |
| Sediment Tolerant Percent | 0.75% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 2.580 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.00% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 3.838 | | 3 | | 2 |
| Intolerant Percent | 25.42% | | | | |
| Supertolerant Percent | 3.95% | | | | |
| CTQa | 97.333 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 18 | 36.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 20 | 66.67% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 5 | 27.78% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 6 | 28.57% | Moderate |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD008
**Sta. Name:** Lakehurst just upstream of pond, E of I405
**Client ID:** Lakehurst 1
**STORET ID:** 500 subsample
**Coll. Date:** 8/27/2010

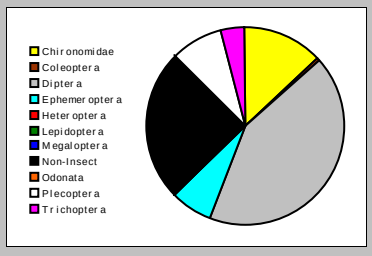
## Abundance Measures

**Sample Count:** 524
**Sample Abundance:** 748.57 70.00% of sample used

**Coll. Procedure:** 8 surbers
**Sample Notes:** Lkhrst405

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 13 | 131 | 25.00% |
| Odonata | | | |
| Ephemeroptera | 1 | 37 | 7.06% |
| Plecoptera | 1 | 45 | 8.59% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 2 | 20 | 3.82% |
| Lepidoptera | | | |
| Coleoptera | 2 | 3 | 0.57% |
| Diptera | 4 | 220 | 41.98% |
| Chironomidae | 7 | 68 | 12.98% |

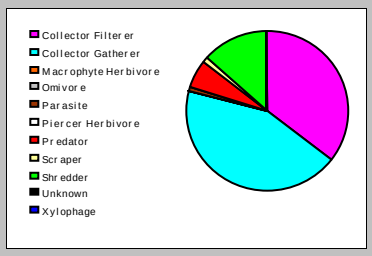



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Simulium | 183 | 34.92% |
| Crangonyx | 92 | 17.56% |
| Parametriocnemus | 51 | 9.73% |
| Malenka | 45 | 8.59% |
| Baetis tricaudatus | 37 | 7.06% |
| Tipula | 22 | 4.20% |
| Parapsyche almota | 19 | 3.63% |
| Dixa | 11 | 2.10% |
| Fridericia | 9 | 1.72% |
| Micropsectra | 7 | 1.34% |
| Lumbriculus | 7 | 1.34% |
| Tvetenia | 5 | 0.95% |
| Nematoda | 5 | 0.95% |
| Enchytraeus | 4 | 0.76% |
| Dicranota | 4 | 0.76% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 7 | 30 | 5.73% |
| Parasite | 1 | 5 | 0.95% |
| Collector Gatherer | 14 | 230 | 43.89% |
| Collector Filterer | 1 | 183 | 34.92% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 3 | 6 | 1.15% |
| Shredder | 4 | 70 | 13.36% |
| Omivore | | | |
| Unknown | | | |

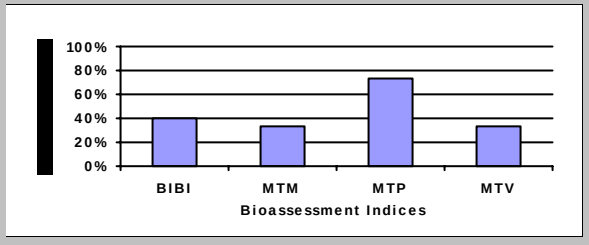



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 30 | 3 | 3 | | 3 |
| Non-Insect Percent | 25.00% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 2 | 1 | | 1 | |
| EPT Richness | 4 | | 1 | | 0 |
| EPT Percent | 19.47% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 5.15% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.950 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 34.92% | | 2 | | 2 |
| Dominant Taxa (2) Percent | 52.48% | | | | |
| Dominant Taxa (3) Percent | 62.21% | 3 | | | |
| Dominant Taxa (10) Percent | 90.84% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.243 | | | | |
| Shannon H (log2) | 3.236 | | 3 | | |
| Margalef D | 4.644 | | | | |
| Simpson D | 0.173 | | | | |
| Evenness | 0.074 | | | | |
| *Function* | | | | | |
| Predator Richness | 7 | | 3 | | |
| Predator Percent | 5.73% | 1 | | | |
| Filterer Richness | 1 | | | | |
| Filterer Percent | 34.92% | | | 0 | |
| Collector Percent | 78.82% | | 2 | | 1 |
| Scraper+Shredder Percent | 14.50% | | 1 | | 0 |
| Scraper/Filterer | 0.033 | | | | |
| Scraper/Scraper+Filterer | 0.032 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 3 | | | | |
| Burrower Percent | 5.15% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 9.16% | | | | |
| Clinger Richness | 4 | 1 | | | |
| Clinger Percent | 39.12% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.57% | | | | |
| Air Breather Richness | 3 | | | | |
| Air Breather Percent | 5.15% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 14 | | | | |
| Semivoltine Richness | 3 | 3 | | | |
| Multivoltine Percent | 20.99% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 3 | | | | |
| Sediment Tolerant Percent | 5.34% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 4.155 | | | | |
| Pollution Sensitive Richness | 1 | 1 | | 1 | |
| Pollution Tolerant Percent | 0.76% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 4.905 | | 3 | | 1 |
| Intolerant Percent | 11.26% | | | | |
| Supertolerant Percent | 1.72% | | | | |
| CTQa | 87.900 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 20 | 40.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 22 | 73.33% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 6 | 33.33% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 7 | 33.33% | Moderate |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD009
**Sta. Name:** Newport stabilized reach d/s of swim club on 119th Rep 1
**Client ID:** Newport 1
**STORET ID:** 500 subsample
**Coll. Date:** 8/18/2010

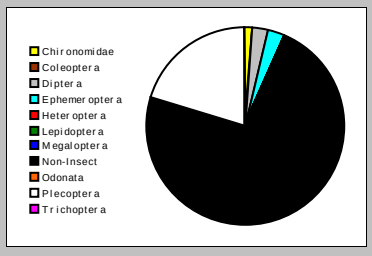
## Abundance Measures

**Sample Count:** 500
**Sample Abundance:** 625.00 80.00% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** NewpStab

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 11 | 365 | 73.00% |
| Odonata | | | |
| Ephemeroptera | 1 | 14 | 2.80% |
| Plecoptera | 1 | 101 | 20.20% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | | | |
| Diptera | 5 | 13 | 2.60% |
| Chironomidae | 5 | 7 | 1.40% |

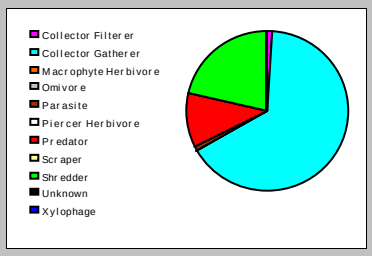



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Mesenchytraeus | 253 | 50.60% |
| Malenka | 101 | 20.20% |
| Turbellaria | 47 | 9.40% |
| Lumbriculus | 20 | 4.00% |
| Crangonyx | 19 | 3.80% |
| Baetis tricaudatus | 14 | 2.80% |
| Nematoda | 6 | 1.20% |
| Enchytraeus | 5 | 1.00% |
| Tipula | 4 | 0.80% |
| Simulium | 4 | 0.80% |
| Naididae (Tubificinae) - without c | 4 | 0.80% |
| Fridericia | 4 | 0.80% |
| Acari | 4 | 0.80% |
| Dixa | 3 | 0.60% |
| Sphaeriidae | 2 | 0.40% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 4 | 54 | 10.80% |
| Parasite | 1 | 6 | 1.20% |
| Collector Gatherer | 13 | 327 | 65.40% |
| Collector Filterer | 2 | 6 | 1.20% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 3 | 107 | 21.40% |
| Omivore | | | |
| Unknown | | | |

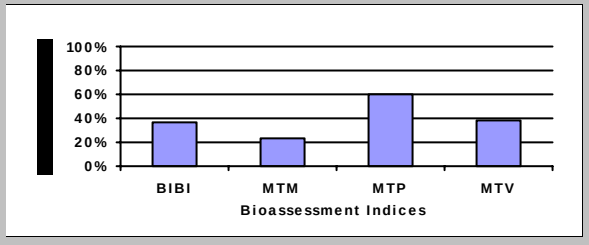



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 23 | 3 | 2 | | 1 |
| Non-Insect Percent | 73.00% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 2 | | 0 | | 0 |
| EPT Percent | 23.00% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 57.40% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 50.60% | | 1 | | 0 |
| Dominant Taxa (2) Percent | 70.80% | | | | |
| Dominant Taxa (3) Percent | 80.20% | 1 | | | |
| Dominant Taxa (10) Percent | 94.60% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.707 | | | | |
| Shannon H (log2) | 2.463 | | 2 | | |
| Margalef D | 3.540 | | | | |
| Simpson D | 0.309 | | | | |
| Evenness | 0.088 | | | | |
| *Function* | | | | | |
| Predator Richness | 4 | | 2 | | |
| Predator Percent | 10.80% | 3 | | | |
| Filterer Richness | 2 | | | | |
| Filterer Percent | 1.20% | | | 3 | |
| Collector Percent | 66.60% | | 2 | | 2 |
| Scraper+Shredder Percent | 21.40% | | 2 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 3 | | | | |
| Burrower Percent | 1.20% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 3.40% | | | | |
| Clinger Richness | 2 | 1 | | | |
| Clinger Percent | 1.20% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 2 | | | | |
| Hemoglobin Bearer Percent | 0.60% | | | | |
| Air Breather Richness | 2 | | | | |
| Air Breather Percent | 1.00% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 10 | | | | |
| Semivoltine Richness | 0 | 1 | | | |
| Multivoltine Percent | 15.20% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 1 | | | | |
| Sediment Tolerant Percent | 0.80% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 2.527 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.00% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 3.530 | | 3 | | 2 |
| Intolerant Percent | 20.80% | | | | |
| Supertolerant Percent | 0.80% | | | | |
| CTQa | 93.176 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 18 | 36.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 18 | 60.00% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 7 | 38.89% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 5 | 23.81% | Moderate |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD010
**Sta. Name:** Newport stabilized reach d/s of swim club on 119th Rep 2
**Client ID:** Newport 2
**STORET ID:** 500 subsample
**Coll. Date:** 8/18/2010

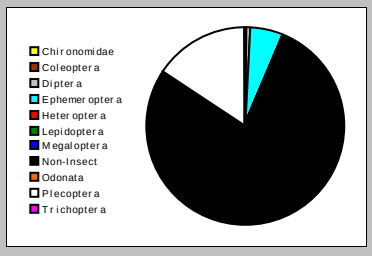
## *Abundance Measures*

**Sample Count:** 502
**Sample Abundance:** 579.23 86.67% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** NewpStab

## *Taxonomic Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 9 | 392 | 78.09% |
| Odonata | | | |
| Ephemeroptera | 1 | 27 | 5.38% |
| Plecoptera | 1 | 78 | 15.54% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | | | |
| Diptera | 2 | 4 | 0.80% |
| Chironomidae | 1 | 1 | 0.20% |

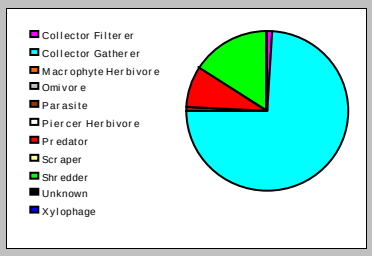



## *Dominant Taxa*

| Category | A | PRA |
|---|---|---|
| Mesenchytraeus | 194 | 38.65% |
| Lumbriculus | 99 | 19.72% |
| Malenka | 78 | 15.54% |
| Turbellaria | 42 | 8.37% |
| Baetis tricaudatus | 27 | 5.38% |
| Crangonyx | 22 | 4.38% |
| Naididae (Tubificinae) - without c | 15 | 2.99% |
| Fridericia | 10 | 1.99% |
| Sphaeriidae | 5 | 1.00% |
| Nematoda | 4 | 0.80% |
| Tipula | 2 | 0.40% |
| Dixa | 2 | 0.40% |
| Parametriocnemus | 1 | 0.20% |
| Naididae (Tubificinae) - with capill | 1 | 0.20% |

## *Functional Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 1 | 42 | 8.37% |
| Parasite | 1 | 4 | 0.80% |
| Collector Gatherer | 9 | 371 | 73.90% |
| Collector Filterer | 1 | 5 | 1.00% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 2 | 80 | 15.94% |
| Omivore | | | |
| Unknown | | | |

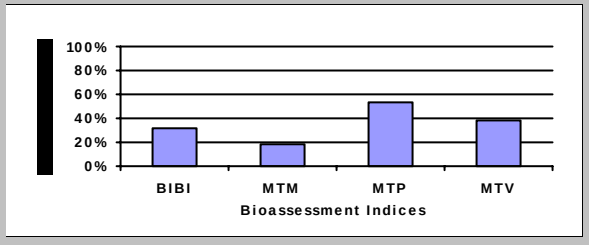



## *Metric Values and Scores*

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 14 | 1 | 1 | | 0 |
| Non-Insect Percent | 78.09% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 2 | | 0 | | 0 |
| EPT Percent | 20.92% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 63.55% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 38.65% | | 2 | | 1 |
| Dominant Taxa (2) Percent | 58.37% | | | | |
| Dominant Taxa (3) Percent | 73.90% | 3 | | | |
| Dominant Taxa (10) Percent | 98.80% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.815 | | | | |
| Shannon H (log2) | 2.618 | | 2 | | |
| Margalef D | 2.091 | | | | |
| Simpson D | 0.224 | | | | |
| Evenness | 0.109 | | | | |
| *Function* | | | | | |
| Predator Richness | 1 | | 0 | | |
| Predator Percent | 8.37% | 1 | | | |
| Filterer Richness | 1 | | | | |
| Filterer Percent | 1.00% | | | 3 | |
| Collector Percent | 74.90% | | 2 | | 1 |
| Scraper+Shredder Percent | 15.94% | | 2 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 1 | | | | |
| Burrower Percent | 0.40% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 5.78% | | | | |
| Clinger Richness | 0 | 1 | | | |
| Clinger Percent | 0.00% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | | | | | |
| Hemoglobin Bearer Percent | | | | | |
| Air Breather Richness | 1 | | | | |
| Air Breather Percent | 0.40% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 6 | | | | |
| Semivoltine Richness | 0 | 1 | | | |
| Multivoltine Percent | 14.74% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 1 | | | | |
| Sediment Tolerant Percent | 0.40% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 2.692 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.00% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 3.641 | | 3 | | 2 |
| Intolerant Percent | 15.94% | | | | |
| Supertolerant Percent | 1.00% | | | | |
| CTQa | 88.000 | | | | |

## *Bioassessment Indices*

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 16 | 32.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 16 | 53.33% | Moderate |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 7 | 38.89% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 4 | 19.05% | Severe |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD011
**Sta. Name:** Newport stabilized reach d/s of swim club on 119th Rep 3
**Client ID:** Newport 3
**STORET ID:** 500 subsample
**Coll. Date:** 8/18/2010

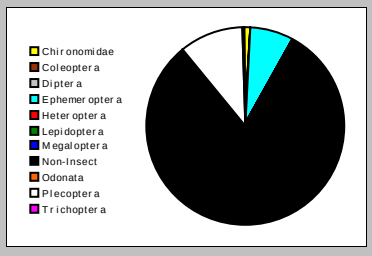
## *Abundance Measures*

**Sample Count:** 500
**Sample Abundance:** 3,000.00 16.67% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** NewpStab

## *Taxonomic Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 11 | 405 | 81.00% |
| Odonata | | | |
| Ephemeroptera | 1 | 34 | 6.80% |
| Plecoptera | 1 | 53 | 10.60% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 1 | 2 | 0.40% |
| Lepidoptera | | | |
| Coleoptera | | | |
| Diptera | 1 | 1 | 0.20% |
| Chironomidae | 3 | 5 | 1.00% |

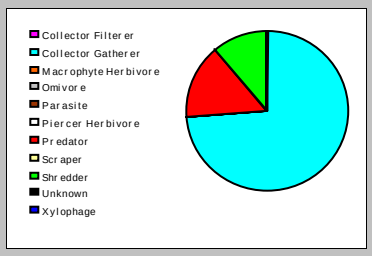



## *Dominant Taxa*

| Category | A | PRA |
|---|---|---|
| Mesenchytraeus | 198 | 39.60% |
| Lumbriculus | 94 | 18.80% |
| Turbellaria | 71 | 14.20% |
| Malenka | 53 | 10.60% |
| Baetis tricaudatus | 34 | 6.80% |
| Crangonyx | 13 | 2.60% |
| Naididae (Tubificinae) - without c | 10 | 2.00% |
| Enchytraeus | 7 | 1.40% |
| Fridericia | 5 | 1.00% |
| Sphaeriidae | 2 | 0.40% |
| Parapsyche almota | 2 | 0.40% |
| Paraphaenocladius | 2 | 0.40% |
| Naididae (Tubificinae) - with capill | 2 | 0.40% |
| Erpobdellidae | 2 | 0.40% |
| Brillia | 2 | 0.40% |

## *Functional Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 3 | 75 | 15.00% |
| Parasite | 1 | 1 | 0.20% |
| Collector Gatherer | 10 | 366 | 73.20% |
| Collector Filterer | 2 | 3 | 0.60% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | | | |
| Shredder | 2 | 55 | 11.00% |
| Omivore | | | |
| Unknown | | | |

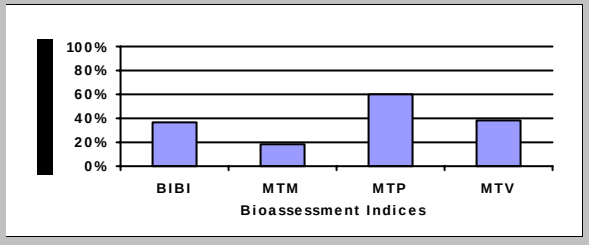



## *Metric Values and Scores*

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 18 | 1 | 2 | | 0 |
| Non-Insect Percent | 81.00% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 1 | 1 | | 0 | |
| EPT Richness | 3 | | 1 | | 0 |
| EPT Percent | 17.80% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 63.60% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 1.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 39.60% | | 2 | | 1 |
| Dominant Taxa (2) Percent | 58.40% | | | | |
| Dominant Taxa (3) Percent | 72.60% | 3 | | | |
| Dominant Taxa (10) Percent | 97.40% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.828 | | | | |
| Shannon H (log2) | 2.637 | | 2 | | |
| Margalef D | 2.735 | | | | |
| Simpson D | 0.228 | | | | |
| Evenness | 0.099 | | | | |
| *Function* | | | | | |
| Predator Richness | 3 | | 1 | | |
| Predator Percent | 15.00% | 3 | | | |
| Filterer Richness | 2 | | | | |
| Filterer Percent | 0.60% | | | 3 | |
| Collector Percent | 73.80% | | 2 | | 1 |
| Scraper+Shredder Percent | 11.00% | | 1 | | 0 |
| Scraper/Filterer | 0.000 | | | | |
| Scraper/Scraper+Filterer | 0.000 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 1 | | | | |
| Burrower Percent | 0.40% | | | | |
| Swimmer Richness | 1 | | | | |
| Swimmer Percent | 6.80% | | | | |
| Clinger Richness | 2 | 1 | | | |
| Clinger Percent | 0.60% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.40% | | | | |
| Air Breather Richness | 0 | | | | |
| Air Breather Percent | 0.00% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 6 | | | | |
| Semivoltine Richness | 1 | 1 | | | |
| Multivoltine Percent | 22.20% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 0 | | | | |
| Sediment Tolerant Percent | 0.00% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 3.260 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.00% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 3.762 | | 3 | | 2 |
| Intolerant Percent | 10.60% | | | | |
| Supertolerant Percent | 0.80% | | | | |
| CTQa | 90.500 | | | | |

## *Bioassessment Indices*

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 18 | 36.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 18 | 60.00% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 7 | 38.89% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 4 | 19.05% | Severe |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD012
**Sta. Name:** Wilkins Upstream of Bypass, at NE 8th & Northup Wy.
**Client ID:** Wilkins 1
**STORET ID:** 700 subsample
**Coll. Date:** 8/30/2010

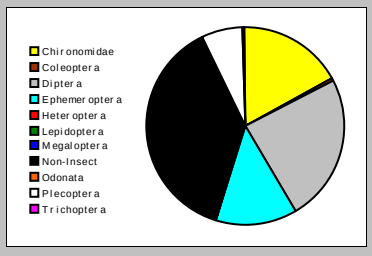
## *Abundance Measures*

**Sample Count:** 607
**Sample Abundance:** 607.00 100.00% of sample used

**Coll. Procedure:** 8 surbers
**Sample Notes:** WilkUpstr

## *Taxonomic Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 9 | 231 | 38.06% |
| Odonata | | | |
| Ephemeroptera | 1 | 82 | 13.51% |
| Plecoptera | 1 | 42 | 6.92% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 1 | 1 | 0.16% |
| Lepidoptera | | | |
| Coleoptera | 1 | 2 | 0.33% |
| Diptera | 7 | 145 | 23.89% |
| Chironomidae | 9 | 104 | 17.13% |

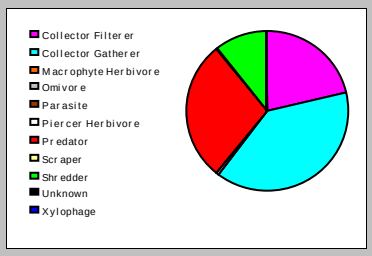



## *Dominant Taxa*

| Category | A | PRA |
|---|---|---|
| Turbellaria | 145 | 23.89% |
| Simulium | 120 | 19.77% |
| Baetis tricaudatus | 82 | 13.51% |
| Malenka | 42 | 6.92% |
| Parametriocnemus | 24 | 3.95% |
| Tvetenia | 21 | 3.46% |
| Lumbriculus | 21 | 3.46% |
| Eukiefferiella | 20 | 3.29% |
| Mesenchytraeus | 19 | 3.13% |
| Enchytraeus | 16 | 2.64% |
| Acari | 16 | 2.64% |
| Brillia | 15 | 2.47% |
| Microtendipes | 9 | 1.48% |
| Fridericia | 7 | 1.15% |
| Micropsectra | 6 | 0.99% |

## *Functional Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 4 | 172 | 28.34% |
| Parasite | | | |
| Collector Gatherer | 16 | 237 | 39.04% |
| Collector Filterer | 2 | 129 | 21.25% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 1 | 1 | 0.16% |
| Shredder | 5 | 64 | 10.54% |
| Omivore | 1 | 4 | 0.66% |
| Unknown | | | |

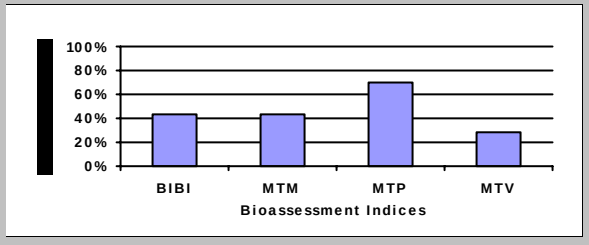



## *Metric Values and Scores*

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 29 | 3 | 3 | | 3 |
| Non-Insect Percent | 38.06% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 1 | 1 | | 0 | |
| EPT Richness | 3 | | 1 | | 0 |
| EPT Percent | 20.59% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 11.04% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 23.89% | | 3 | | 3 |
| Dominant Taxa (2) Percent | 43.66% | | | | |
| Dominant Taxa (3) Percent | 57.17% | 3 | | | |
| Dominant Taxa (10) Percent | 84.02% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.528 | | | | |
| Shannon H (log2) | 3.647 | | 3 | | |
| Margalef D | 4.400 | | | | |
| Simpson D | 0.124 | | | | |
| Evenness | 0.066 | | | | |
| *Function* | | | | | |
| Predator Richness | 4 | | 2 | | |
| Predator Percent | 28.34% | 5 | | | |
| Filterer Richness | 2 | | | | |
| Filterer Percent | 21.25% | | | 1 | |
| Collector Percent | 60.30% | | 2 | | 2 |
| Scraper+Shredder Percent | 10.71% | | 1 | | 0 |
| Scraper/Filterer | 0.008 | | | | |
| Scraper/Scraper+Filterer | 0.008 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 3 | | | | |
| Burrower Percent | 3.79% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 14.33% | | | | |
| Clinger Richness | 4 | 1 | | | |
| Clinger Percent | 22.24% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 2 | | | | |
| Hemoglobin Bearer Percent | 1.65% | | | | |
| Air Breather Richness | 2 | | | | |
| Air Breather Percent | 0.82% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 12 | | | | |
| Semivoltine Richness | 2 | 1 | | | |
| Multivoltine Percent | 56.84% | | 2 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 2 | | | | |
| Sediment Tolerant Percent | 0.82% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 4.331 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.66% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 4.524 | | 3 | | 1 |
| Intolerant Percent | 8.07% | | | | |
| Supertolerant Percent | 4.12% | | | | |
| CTQa | 98.905 | | | | |

## *Bioassessment Indices*

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 22 | 44.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 21 | 70.00% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 5 | 27.78% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 9 | 42.86% | Moderate |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD013
**Sta. Name:** Wilkins In bypass reach, near NE 8th & Northup Wy.
**Client ID:** Wilkins 2
**STORET ID:** 700 subsample
**Coll. Date:** 8/30/2010

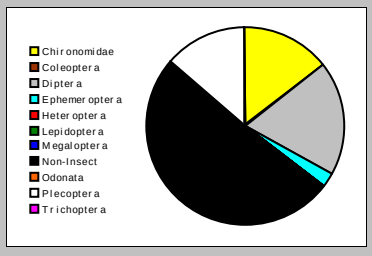
## *Abundance Measures*

**Sample Count:** 564
**Sample Abundance:** 564.00 100.00% of sample used

**Coll. Procedure:** 8 surbers
**Sample Notes:** WilkBypass

## *Taxonomic Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 9 | 286 | 50.71% |
| Odonata | | | |
| Ephemeroptera | 1 | 14 | 2.48% |
| Plecoptera | 1 | 77 | 13.65% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | | | |
| Lepidoptera | | | |
| Coleoptera | 1 | 1 | 0.18% |
| Diptera | 6 | 105 | 18.62% |
| Chironomidae | 12 | 81 | 14.36% |

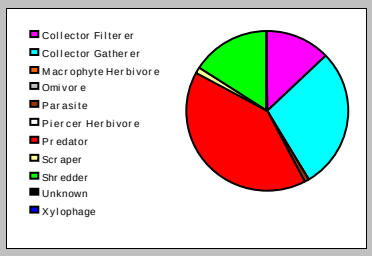



## *Dominant Taxa*

| Category | A | PRA |
|---|---|---|
| Turbellaria | 162 | 28.72% |
| Simulium | 72 | 12.77% |
| Malenka | 72 | 12.77% |
| Acari | 66 | 11.70% |
| Parametriocnemus | 34 | 6.03% |
| Enchytraeus | 25 | 4.43% |
| Dixa | 22 | 3.90% |
| Eukiefferiella | 15 | 2.66% |
| Baetis tricaudatus | 14 | 2.48% |
| Tvetenia | 10 | 1.77% |
| Tipula | 8 | 1.42% |
| Mesenchytraeus | 7 | 1.24% |
| Lumbriculus | 6 | 1.06% |
| Fridericia | 6 | 1.06% |
| Nemouridae | 5 | 0.89% |

## *Functional Composition*

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 4 | 230 | 40.78% |
| Parasite | 1 | 5 | 0.89% |
| Collector Gatherer | 15 | 158 | 28.01% |
| Collector Filterer | 2 | 74 | 13.12% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 2 | 6 | 1.06% |
| Shredder | 5 | 90 | 15.96% |
| Omivore | 1 | 1 | 0.18% |
| Unknown | | | |

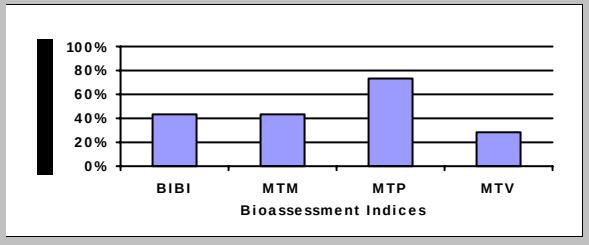



## *Metric Values and Scores*

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 30 | 3 | 3 | | 3 |
| Non-Insect Percent | 50.71% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 1 | 1 | | 1 | |
| T Richness | 0 | 1 | | 0 | |
| EPT Richness | 2 | | 0 | | 0 |
| EPT Percent | 16.13% | | 1 | | 0 |
| Oligochaeta+Hirudinea Percent | 8.16% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.000 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 28.72% | | 3 | | 2 |
| Dominant Taxa (2) Percent | 41.49% | | | | |
| Dominant Taxa (3) Percent | 54.26% | 3 | | | |
| Dominant Taxa (10) Percent | 87.23% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 2.412 | | | | |
| Shannon H (log2) | 3.480 | | 3 | | |
| Margalef D | 4.603 | | | | |
| Simpson D | 0.142 | | | | |
| Evenness | 0.069 | | | | |
| *Function* | | | | | |
| Predator Richness | 4 | | 2 | | |
| Predator Percent | 40.78% | 5 | | | |
| Filterer Richness | 2 | | | | |
| Filterer Percent | 13.12% | | | 1 | |
| Collector Percent | 41.13% | | 3 | | 3 |
| Scraper+Shredder Percent | 17.02% | | 2 | | 0 |
| Scraper/Filterer | 0.081 | | | | |
| Scraper/Scraper+Filterer | 0.075 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 4 | | | | |
| Burrower Percent | 2.30% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 6.38% | | | | |
| Clinger Richness | 6 | 1 | | | |
| Clinger Percent | 14.18% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 0 | | | | |
| Cold Stenotherm Percent | 0.00% | | | | |
| Hemoglobin Bearer Richness | 4 | | | | |
| Hemoglobin Bearer Percent | 1.60% | | | | |
| Air Breather Richness | 2 | | | | |
| Air Breather Percent | 1.60% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 9 | | | | |
| Semivoltine Richness | 2 | 1 | | | |
| Multivoltine Percent | 58.33% | | 2 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 2 | | | | |
| Sediment Tolerant Percent | 2.30% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 3.983 | | | | |
| Pollution Sensitive Richness | 0 | 1 | | 0 | |
| Pollution Tolerant Percent | 0.53% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 4.156 | | 3 | | 1 |
| Intolerant Percent | 17.73% | | | | |
| Supertolerant Percent | 3.90% | | | | |
| CTQa | 96.565 | | | | |

## *Bioassessment Indices*

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 22 | 44.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 22 | 73.33% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 5 | 27.78% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 9 | 42.86% | Moderate |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD014
**Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 1
**Client ID:** Lewis 1
**STORET ID:** 700 subsample
**Coll. Date:** 8/20/2010

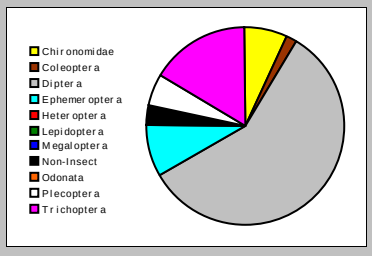
## Abundance Measures

**Sample Count:** 703
**Sample Abundance:** 1,240.59 56.67% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** LewisI90

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 5 | 23 | 3.27% |
| Odonata | | | |
| Ephemeroptera | 2 | 61 | 8.68% |
| Plecoptera | 3 | 36 | 5.12% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 6 | 116 | 16.50% |
| Lepidoptera | | | |
| Coleoptera | 3 | 13 | 1.85% |
| Diptera | 4 | 405 | 57.61% |
| Chironomidae | 8 | 49 | 6.97% |

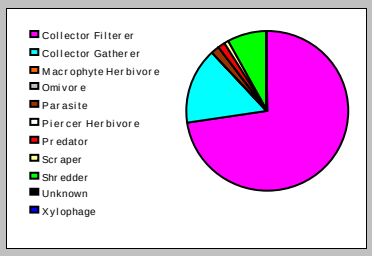



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Simulium | 401 | 57.04% |
| Hydropsyche | 109 | 15.50% |
| Baetis tricaudatus | 56 | 7.97% |
| Malenka | 34 | 4.84% |
| Micropsectra | 20 | 2.84% |
| Brillia | 20 | 2.84% |
| Nematoda | 10 | 1.42% |
| Narpus concolor | 6 | 0.85% |
| Crangonyx | 6 | 0.85% |
| Optioservus | 5 | 0.71% |
| Diphetor hageni | 5 | 0.71% |
| Lumbriculus | 4 | 0.57% |
| Nais | 2 | 0.28% |
| Heterlimnius | 2 | 0.28% |
| Empididae | 2 | 0.28% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 7 | 10 | 1.42% |
| Parasite | 1 | 10 | 1.42% |
| Collector Gatherer | 14 | 109 | 15.50% |
| Collector Filterer | 3 | 511 | 72.69% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 2 | 6 | 0.85% |
| Shredder | 4 | 57 | 8.11% |
| Omivore | | | |
| Unknown | | | |

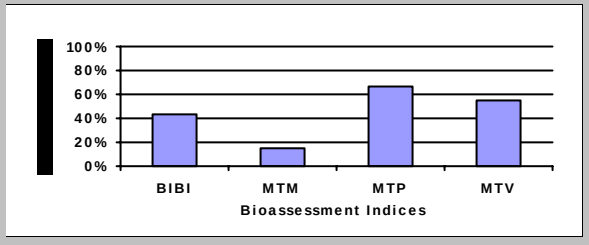



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 31 | 3 | 3 | | 3 |
| Non-Insect Percent | 3.27% | | | | |
| E Richness | 2 | 1 | | 1 | |
| P Richness | 3 | 1 | | 2 | |
| T Richness | 6 | 3 | | 3 | |
| EPT Richness | 11 | | 3 | | 0 |
| EPT Percent | 30.30% | | 2 | | 0 |
| Oligochaeta+Hirudinea Percent | 0.85% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.940 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 57.04% | | 1 | | 0 |
| Dominant Taxa (2) Percent | 72.55% | | | | |
| Dominant Taxa (3) Percent | 80.51% | 1 | | | |
| Dominant Taxa (10) Percent | 94.88% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.629 | | | | |
| Shannon H (log2) | 2.351 | | 1 | | |
| Margalef D | 4.584 | | | | |
| Simpson D | 0.359 | | | | |
| Evenness | 0.076 | | | | |
| *Function* | | | | | |
| Predator Richness | 7 | | 3 | | |
| Predator Percent | 1.42% | 1 | | | |
| Filterer Richness | 3 | | | | |
| Filterer Percent | 72.69% | | | 0 | |
| Collector Percent | 88.19% | | 1 | | 0 |
| Scraper+Shredder Percent | 8.96% | | 1 | | 0 |
| Scraper/Filterer | 0.012 | | | | |
| Scraper/Scraper+Filterer | 0.012 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 2 | | | | |
| Burrower Percent | 2.99% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 8.68% | | | | |
| Clinger Richness | 11 | 3 | | | |
| Clinger Percent | 75.68% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 1 | | | | |
| Cold Stenotherm Percent | 0.14% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.28% | | | | |
| Air Breather Richness | 1 | | | | |
| Air Breather Percent | 0.14% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 15 | | | | |
| Semivoltine Richness | 3 | 3 | | | |
| Multivoltine Percent | 17.21% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 0 | | | | |
| Sediment Tolerant Percent | 0.00% | | | | |
| Sediment Sensitive Richness | 1 | | | | |
| Sediment Sensitive Percent | 0.14% | | | | |
| Metals Tolerance Index | 4.555 | | | | |
| Pollution Sensitive Richness | 1 | 1 | | 1 | |
| Pollution Tolerant Percent | 0.71% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 5.192 | | 2 | | 0 |
| Intolerant Percent | 6.69% | | | | |
| Supertolerant Percent | 0.57% | | | | |
| CTQa | 83.889 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 22 | 44.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 20 | 66.67% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 10 | 55.56% | Slight |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 3 | 14.29% | Severe |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD015
**Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 2
**Client ID:** Lewis 2
**STORET ID:** 700 subsample
**Coll. Date:** 8/20/2010

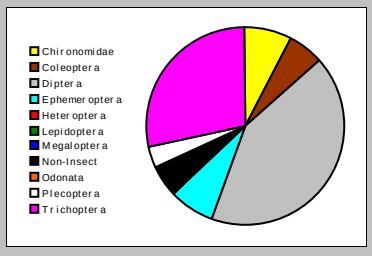
## Abundance Measures

**Sample Count:** 620
**Sample Abundance:** 620.00 100.00% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** LewisI90

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 7 | 33 | 5.32% |
| Odonata | | | |
| Ephemeroptera | 4 | 46 | 7.42% |
| Plecoptera | 4 | 20 | 3.23% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 4 | 178 | 28.71% |
| Lepidoptera | | | |
| Coleoptera | 4 | 36 | 5.81% |
| Diptera | 5 | 259 | 41.77% |
| Chironomidae | 10 | 48 | 7.74% |

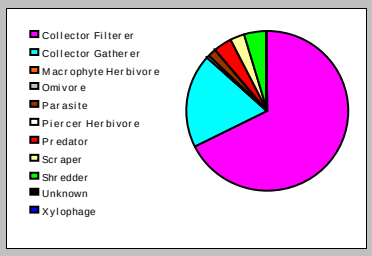



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Simulium | 252 | 40.65% |
| Hydropsyche | 166 | 26.77% |
| Baetis tricaudatus | 38 | 6.13% |
| Micropsectra | 30 | 4.84% |
| Optioservus | 14 | 2.26% |
| Malenka | 14 | 2.26% |
| Zaitzevia | 11 | 1.77% |
| Nematoda | 11 | 1.77% |
| Narpus concolor | 9 | 1.45% |
| Lumbriculus | 8 | 1.29% |
| Turbellaria | 7 | 1.13% |
| Rhyacophila Brunnea Gr. | 7 | 1.13% |
| Polypedilum | 6 | 0.97% |
| Diphetor hageni | 5 | 0.81% |
| Dixa | 3 | 0.48% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 7 | 24 | 3.87% |
| Parasite | 1 | 11 | 1.77% |
| Collector Gatherer | 17 | 120 | 19.35% |
| Collector Filterer | 2 | 418 | 67.42% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 3 | 17 | 2.74% |
| Shredder | 7 | 28 | 4.52% |
| Omivore | 1 | 2 | 0.32% |
| Unknown | | | |

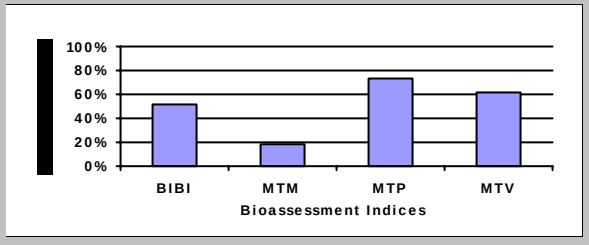



## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 38 | 3 | 3 | | 3 |
| Non-Insect Percent | 5.32% | | | | |
| E Richness | 4 | 1 | | 2 | |
| P Richness | 4 | 3 | | 3 | |
| T Richness | 4 | 1 | | 2 | |
| EPT Richness | 12 | | 3 | | 0 |
| EPT Percent | 39.35% | | 2 | | 0 |
| Oligochaeta+Hirudinea Percent | 2.10% | | | | |
| Baetidae/Ephemeroptera | 0.935 | | | | |
| Hydropsychidae/Trichoptera | 0.933 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 40.65% | | 2 | | 1 |
| Dominant Taxa (2) Percent | 67.42% | | | | |
| Dominant Taxa (3) Percent | 73.55% | 3 | | | |
| Dominant Taxa (10) Percent | 89.19% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.992 | | | | |
| Shannon H (log2) | 2.874 | | 2 | | |
| Margalef D | 5.784 | | | | |
| Simpson D | 0.253 | | | | |
| Evenness | 0.076 | | | | |
| *Function* | | | | | |
| Predator Richness | 7 | | 3 | | |
| Predator Percent | 3.87% | 1 | | | |
| Filterer Richness | 2 | | | | |
| Filterer Percent | 67.42% | | | 0 | |
| Collector Percent | 86.77% | | 1 | | 0 |
| Scraper+Shredder Percent | 7.26% | | 1 | | 0 |
| Scraper/Filterer | 0.041 | | | | |
| Scraper/Scraper+Filterer | 0.039 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 3 | | | | |
| Burrower Percent | 0.65% | | | | |
| Swimmer Richness | 3 | | | | |
| Swimmer Percent | 7.42% | | | | |
| Clinger Richness | 13 | 3 | | | |
| Clinger Percent | 76.77% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 1 | | | | |
| Cold Stenotherm Percent | 0.32% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.97% | | | | |
| Air Breather Richness | 1 | | | | |
| Air Breather Percent | 0.16% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 16 | | | | |
| Semivoltine Richness | 5 | 5 | | | |
| Multivoltine Percent | 17.90% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 0 | | | | |
| Sediment Tolerant Percent | 0.00% | | | | |
| Sediment Sensitive Richness | 0 | | | | |
| Sediment Sensitive Percent | 0.00% | | | | |
| Metals Tolerance Index | 4.456 | | | | |
| Pollution Sensitive Richness | 1 | 1 | | 1 | |
| Pollution Tolerant Percent | 4.03% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 5.029 | | 2 | | 0 |
| Intolerant Percent | 6.77% | | | | |
| Supertolerant Percent | 0.65% | | | | |
| CTQa | 80.094 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 26 | 52.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 22 | 73.33% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 11 | 61.11% | Slight |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 4 | 19.05% | Severe |



# Metrics Report

**Project ID:** CB10LD
**RAI No.:** CB10LD016
**Sta. Name:** Lewis on Lakemont Blvd. at I-90 Rep 3
**Client ID:** Lewis 3
**STORET ID:** 700 subsample
**Coll. Date:** 8/20/2010

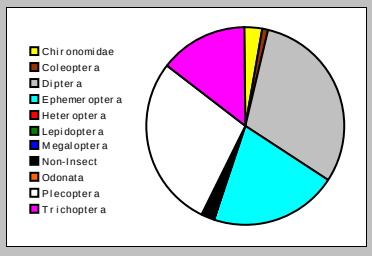
## Abundance Measures

**Sample Count:** 690
**Sample Abundance:** 690.00 100.00% of sample used

**Coll. Procedure:** 3 surbers
**Sample Notes:** LewisI90

## Taxonomic Composition

| Category | R | A | PRA |
|---|---|---|---|
| Non-Insect | 3 | 15 | 2.17% |
| Odonata | | | |
| Ephemeroptera | 1 | 145 | 21.01% |
| Plecoptera | 2 | 196 | 28.41% |
| Heteroptera | | | |
| Megaloptera | | | |
| Trichoptera | 4 | 99 | 14.35% |
| Lepidoptera | | | |
| Coleoptera | 3 | 6 | 0.87% |
| Diptera | 3 | 208 | 30.14% |
| Chironomidae | 5 | 21 | 3.04% |

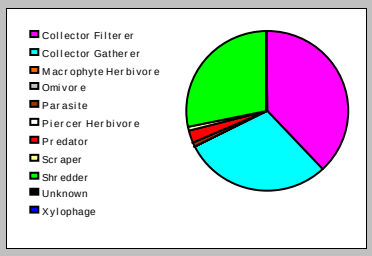



## Dominant Taxa

| Category | A | PRA |
|---|---|---|
| Malenka | 189 | 27.39% |
| Simulium | 164 | 23.77% |
| Baetis tricaudatus | 145 | 21.01% |
| Hydropsyche | 58 | 8.41% |
| Dixa | 42 | 6.09% |
| Hydropsychidae | 36 | 5.22% |
| Micropsectra | 11 | 1.59% |
| Acari | 8 | 1.16% |
| Skwala | 7 | 1.01% |
| Nematoda | 6 | 0.87% |
| Brillia | 4 | 0.58% |
| Polypedilum | 3 | 0.43% |
| Optioservus | 3 | 0.43% |
| Thaumaleidae | 2 | 0.29% |
| Rhyacophila Brunnea Gr. | 2 | 0.29% |

## Functional Composition

| Category | R | A | PRA |
|---|---|---|---|
| Predator | 4 | 18 | 2.61% |
| Parasite | 1 | 6 | 0.87% |
| Collector Gatherer | 8 | 205 | 29.71% |
| Collector Filterer | 3 | 260 | 37.68% |
| Macrophyte Herbivore | | | |
| Piercer Herbivore | | | |
| Xylophage | | | |
| Scraper | 1 | 3 | 0.43% |
| Shredder | 3 | 196 | 28.41% |
| Omivore | 1 | 2 | 0.29% |
| Unknown | | | |




## Metric Values and Scores

| Metric | Value | BIBI | MTP | MTV | MTM |
|---|---|---|---|---|---|
| *Composition* | | | | | |
| Taxa Richness | 21 | 3 | 2 | | 1 |
| Non-Insect Percent | 2.17% | | | | |
| E Richness | 1 | 1 | | 0 | |
| P Richness | 2 | 1 | | 2 | |
| T Richness | 4 | 1 | | 2 | |
| EPT Richness | 7 | | 2 | | 0 |
| EPT Percent | 63.77% | | 3 | | 2 |
| Oligochaeta+Hirudinea Percent | 0.14% | | | | |
| Baetidae/Ephemeroptera | 1.000 | | | | |
| Hydropsychidae/Trichoptera | 0.949 | | | | |
| *Dominance* | | | | | |
| Dominant Taxon Percent | 27.39% | | 3 | | 2 |
| Dominant Taxa (2) Percent | 51.16% | | | | |
| Dominant Taxa (3) Percent | 72.17% | 3 | | | |
| Dominant Taxa (10) Percent | 96.52% | | | | |
| *Diversity* | | | | | |
| Shannon H (loge) | 1.846 | | | | |
| Shannon H (log2) | 2.663 | | 2 | | |
| Margalef D | 3.091 | | | | |
| Simpson D | 0.208 | | | | |
| Evenness | 0.098 | | | | |
| *Function* | | | | | |
| Predator Richness | 4 | | 2 | | |
| Predator Percent | 2.61% | 1 | | | |
| Filterer Richness | 3 | | | | |
| Filterer Percent | 37.68% | | | 0 | |
| Collector Percent | 67.39% | | 2 | | 2 |
| Scraper+Shredder Percent | 28.84% | | 2 | | 1 |
| Scraper/Filterer | 0.012 | | | | |
| Scraper/Scraper+Filterer | 0.011 | | | | |
| *Habit* | | | | | |
| Burrower Richness | 1 | | | | |
| Burrower Percent | 0.58% | | | | |
| Swimmer Richness | 2 | | | | |
| Swimmer Percent | 27.10% | | | | |
| Clinger Richness | 10 | 1 | | | |
| Clinger Percent | 39.71% | | | | |
| *Characteristics* | | | | | |
| Cold Stenotherm Richness | 1 | | | | |
| Cold Stenotherm Percent | 0.29% | | | | |
| Hemoglobin Bearer Richness | 1 | | | | |
| Hemoglobin Bearer Percent | 0.43% | | | | |
| Air Breather Richness | 0 | | | | |
| Air Breather Percent | 0.00% | | | | |
| *Voltinism* | | | | | |
| Univoltine Richness | 9 | | | | |
| Semivoltine Richness | 3 | 3 | | | |
| Multivoltine Percent | 26.09% | | 3 | | |
| *Tolerance* | | | | | |
| Sediment Tolerant Richness | 0 | | | | |
| Sediment Tolerant Percent | 0.00% | | | | |
| Sediment Sensitive Richness | 1 | | | | |
| Sediment Sensitive Percent | 0.29% | | | | |
| Metals Tolerance Index | 3.611 | | | | |
| Pollution Sensitive Richness | 1 | 1 | | 1 | |
| Pollution Tolerant Percent | 0.72% | 5 | | 3 | |
| Hilsenhoff Biotic Index | 3.563 | | 3 | | 2 |
| Intolerant Percent | 34.35% | | | | |
| Supertolerant Percent | 0.14% | | | | |
| CTQa | 83.368 | | | | |

## Bioassessment Indices

| BioIndex | Description | Score | Pct | Rating |
|---|---|---|---|---|
| BIBI | B-IBI (Karr et al.) | 20 | 40.00% | |
| MTP | Montana DEQ Plains (Bukantis 1998) | 24 | 80.00% | Slight |
| MTV | Montana Revised Valleys/Foothills (Bollman 1998) | 8 | 44.44% | Moderate |
| MTM | Montana DEQ Mountains (Bukantis 1998) | 10 | 47.62% | Moderate |